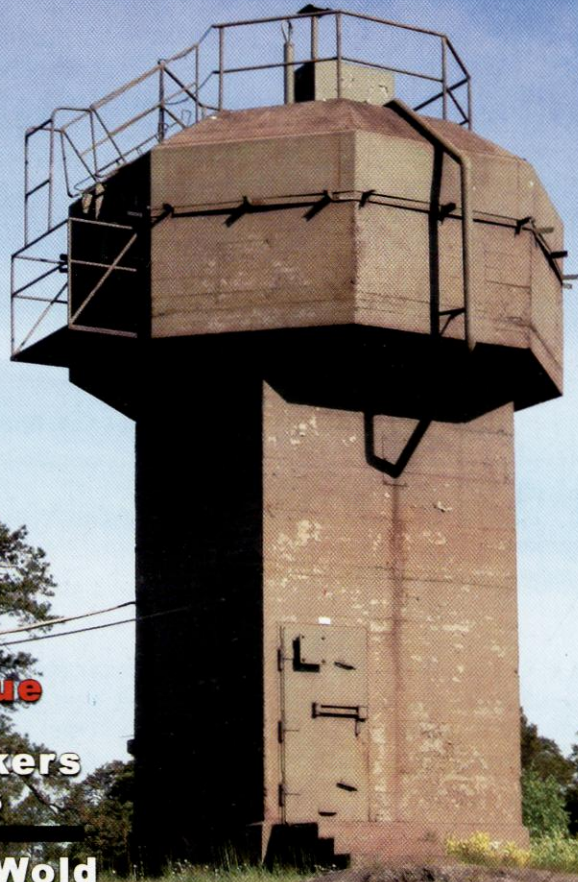


Subterranea

August 2006 Issue 11



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and Forts**

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**The Atlantic Wall
around Cherbourg**

**Books, News
and Reviews**

Subterranea Britannica is a society devoted to the study of man-made and man-used, underground structures and the archaeology of the Cold War. The main focus of interest is on abandoned and forgotten structures and, in the case of Cold War structures, studies are entirely confined to declassified and decommissioned structures. The society is open to all and its membership includes all walks of life. Members are invited to contribute to this magazine even if this just means sending very welcome snippets from newspapers and magazines.

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Newsletters of Subterranea Britannica are published by the committee of Subterranea Britannica. Original articles, book reviews, press cuttings, extracts from books and journals, letters to the editor etc. are welcome. However the editor reserves the right not to publish material without giving a reason.

The committee of Subterranea Britannica and the editor do not necessarily agree with any views expressed and cannot check the accuracy of any material sent in.

Front Cover Photo - The Cold war range finder tower near Nykoping Sweden photo Dan McKenzie. Rear cover - Top The group examine nuclear waste storage tubes on the Swedish Myttinge Line. Access to Femore Forts Gun turret Both Photos Robin Ware

News

NAMHO 2007 Mining History Conference / Field Meeting - Tamar Valley (Cornwall / Devon border) -15th -17th JUNE 2007

The 2007 NAMHO Mining History Conference and Field Meeting will be hosted by the Tamar Mining Group and other local societies on the Cornwall / Devon borders, from 15th to 17th June 2007. For details see the website www.tamarmining.co.uk

The area is especially noteworthy for its copper and arsenic mining sites, of which a number are accessible above and below ground, with important architectural and archaeological remains.

Source: NAMHO Newsletter, June 2006, 2 - 3.
Death of a pioneering underground experimenter: Raymond Davis [1914 - 2006]

Raymond Davis Jr. [1914 - 2006] has died.

In 1960 he set up an experiment 'nearly a mile underground in Dakota' to try to capture solar neutrinos so that he could 'see how the sun - and, by implication, the stars - really work.' The existence of neutrinos had been predicted in 1932, although there was no proof of this until 1956. He used giant tanks of perchlorethylene, C₂Cl₄, in which fluid neutrinos will (very occasionally) interact with chlorine atoms converting them to a radio-isotope of argon. He first attempted this 'half a mile underground in an Ohio limestone mine, but this it seemed was too shallow to filter out cosmic rays. He then removed his detector tanks and equipment to the Homestake gold mine, 4,800 feet below the Black Hills of Dakota, where he used a 100,000 gallon tank of perchlorethylene, and was successful in detecting about one third of the expected neutrino flux, a discrepancy which further work explained.

Source: Frank CLOSE, 2006, Obituary: Raymond Davis. Nobel prizewinning chemist who looked into the heart of stars and analysed moon rocks. The Guardian, 19 June 2006, page 34.

MPs' Underground Group to be Re-Formed

The All-Party Parliamentary Group for Underground Space is to be re-formed. It was first established in 2002 by the then Labour MP for Scarborough & Whitby, Lawrie Quinn, in liaison with the British Tunnelling Society. The Group lapsed on Mr. Quinn losing his seat in the May 2005 General Election, but has now been re-launched with Nick Raynsford MP as Chairman. The Group's aim, in liaison with the BTS, is to encourage greater understanding amongst MPs of issues relating to underground space, including transportation, nuclear waste

disposal, and the possible underground storage of carbon dioxide as a means of removing this greenhouse gas from the atmosphere and thus reducing the effects of global warming.

Source: ANON, 2006, MPs underground group to be re-formed. New Civil Engineer, 27 April 2006, page 11.

Sir Peter Henry Berry Otway Smithers [1913 - 2006] - 'The man who saved Winchester' - dies

Sir Peter Henry Berry Otway Smithers, who was born on 9 December 1913, died on 8 Jun2 2006. In 1962, whilst MP (Conservative) for Winchester, 'his only achievement in domestic politics was to stop the Gas Council. from building a vast underground reservoir near Winchester Cathedral to store gas imported from Algeria.' Amongst his other claims to fame were his role as 'part-model for his wartime friend Ian Fleming's super-spy, James Bond.'

Source: Obituaries in The Daily Telegraph, 10 June 2006, and The Guardian, 15 June 2005, page 34.

The Science Museum Library

The Science Museum Library has for some years been housed in the Library building of Imperial College at South Kensington, but its future has been put into doubt as a result of the College demanding a much higher rent than previously. It has been open to the public free and without formality. Proposals for the future have included dispersing the contents to a number of other locations, either physically difficult of access or not open to the general public. As a result of continuing discussions between the Museum and the College, new proposals have been agreed which they 'believe will safeguard the future of the collection and at the same time create world-class library facilities for the 21st century.' They have now agreed that:

- The component parts of the collections should remain accessible as at present
- The Central Library Building at South Kensington will remain the focal point.
- All frequently used materials will be retained there and the collections will continue to be developed 'at a level appropriate to needs and within available resources'
- Less frequently used materials will be removed to secure storage at the Science Museum site at Wroughton, near Swindon, starting in April 2006, but will be available to library users at South Kensington on 24 hours notice
- The Rare Book Collection will be relocated to new facilities in the Science Museum at South

News

Kensington

- Imperial College will refurbish the South Kensington facilities to provide increased space for silent study and ensure appropriate access to electronically stored information (July - September 2006)
- The future relationship between the Museum and the College will be governed by a legal agreement. The staffing implications are the subject of continuing discussion.

Source: Brian STRONG, 2006, Science Museum Library. GLIAS Newsletter 223, 10-11.

The Oxford Dictionary of National Biography now available on line without charge at 127 local authority public libraries

From 1 April 2006 there will be free access to the Oxford Dictionary of National Biography and its updates, initially for two years, with access from home or from your local public library, for the members of 127 local authority library services. The electronic version of the ODNB has the advantage over the unwieldy multi-volume paper version that the entire work can rapidly be searched for specific search terms, as well as specific people. Local public library membership numbers will be required for access.

Source: Brian STRONG, 2006, Oxford Dictionary of National Biography - on line. GLIAS Newsletter 223, page 11.

NEWS - ARCHAEOLOGY

Cave art no More than lavatory wall daubings?

It has been suggested that much 'cave art' depicts crudely drawn genitalia and was the work of male teenagers with no more artistic merit than those who in modern times decorate the interiors of public lavatories.

Source: Dale GUTHRIE, 2006, Ancient yobs underground. Descent 189, page 6.

Possibly late Neolithic cave art reported from a chambered tomb on Anglesey, North Wales

A possibly late Neolithic (c. 2,500 BC) chambered tomb standing high on a promontory in SE Anglesey, Barclodiad y Gawres, was investigated in 1952 - 53 when upright megaliths were recorded forming the walls of a passageway leading to a cruciform chamber. Subsequent and continuing investigations have revealed extensive 'cave art' in the form of engravings on the megaliths, including some so far

into the tomb that they cannot be seen other than with imported artificial lighting. These may, of course, have been engraved during the tomb's construction, if it was made by the 'cut-and-cover' method. However, further recent investigations have revealed evidence for a hearth in the terminal chamber, suggesting the possibility that the engravings may have been made by the light of a fire, or that such a fire was lit, when required, to view the art.

Source: George NASH, Abby GEORGE, Debbie HUDSON, Ann SMITH, and Adam STANFORD, 2006, Barclodiad y Gawres - giving up more secrets? Current Archaeology 17(11)(203), page 566.

5000-year-old human remains and artifacts reported at a South Wales cave

Skeletal remains of seven persons, dated to around 5,000 years old, have been reported from an evidently purpose-made burial pit at the entrance to a cave in Goldsland Wood, near Wenvoe, southwest of Cardiff. Associated with these were stone tools, pottery fragments, a belt-fastening, and bone and jet personal ornaments.

Source: ANON, 2006, Human remains found in cave. Descent 190, page 23.

The Forest of Dean (Gloucestershire) Scowles, and Wealden iron ore mines

Brian Herbert, in the Newsletter of the Wealden Iron Research Group, has commented on an article in The Daily Telegraph of 3 December 2005 concerning the 'scowles' or iron ore pits, some five to six metres deep and 'interlinking for many tens of metres' in an ironstone mining zone around the central coalfield in the Forest of Dean. The ore occurred infilling former solution caves in the Crease Limestone and, it has been supposed, was dug out from Roman times onwards leaving the irregularly shaped caves or 'scowles' as they are known locally. At deeper levels, ore was mined in this way and in the same context in much more modern times, and a number of mine-workings are still accessible, including those operated as a public visitor attraction at Clearwell Caves.

There is, however, some doubt about the existence of any firm dating evidence from the Roman period for the scowles. Brian Herbert remarks that much the same is true concerning the supposed Roman ironstone mines or mine-pits in the Kent and Sussex Weald, although in that area no clear evidence exists for anything other than steep-sided opencast ore pits.

Investigations are under way in Lydney Park (in the

News

Forest), at a site where Sir Mortimer Wheeler excavated a Roman temple and apparently associated underground ironstone mine in 1929. As the limestone hosting the scowles has some potential commercial value as a source of aggregate, these features must be considered to be at risk. There is thus, currently, a programme to survey the scowles. Surface manifestations of some of the scowles, as at 'the Devil's Chapel' and 'Puzzle Wood,' are open to the public as tourist attractions, where it is possible to wander around and amongst chasms between bizarrely shaped limestone crags.

Source: Brian HERBERT, 2006, Forest of Dean iron ore. Newsletter Wealden Iron Research group 43, 11 - 12.

Chalybeate stream in a stone-lined culvert of unknown date at Strawberry Wood, near Benenden, Kent

A stone-lined culvert of unknown date in Strawberry Wood south of Benenden, from which flows a chalybeate stream (one in which the water contains dissolved or suspended iron compounds), is reportedly in danger of being destroyed by occasional flooding. There are currently proposals to consolidate the stone-lined walls, and ceiling of stone slab lintels. The culvert is 5.2m long, 1.9m wide, and 0.8m high, and of unknown date or function. The site at TQ 81302 31866 lies in private land, but is visible from the High Weald Landscape Trail. Persons who may feel qualified to express an opinion concerning the date or function of the culvert, or who may like to assist with its restoration, are invited to contact Ernie Pollard at ernie@pollardweb.com.

Source: ANON, 2006, Strawberry Wood Culvert Project. News. Kent Archaeological Society 68, page 16

Building-stones and quarries database online

An online database of stone types and quarries has been created, launched in November 2005 by the Archaeology Department of the University of Southampton in collaboration with the Archaeology Data Service.

At present the database has entries for 200 named stone types, 300 quarry locations, and 500 examples where the stones have been used. Technical data for the stone types are included, as are photographs of stone samples and of thin sections, along with bibliographical references. Corrections and additions would be welcomed. The database is available at <http://ads.ahds.ac.uk/catalogue/resources.html>? stones ahrb 2005

Source: Stuart JEFFREY, 2006, Resource enhancement grants: Stone in Archaeology Archive released. Archaeology Data Service News 18 (Spring / Summer 2006), page 3.

Rock-cut funicular railway tunnel and engine room at Hastings, East Sussex

The West Cliff Railway at Hastings runs from its bottom station in George Street to its top station on West Cliff at TQ 821095, within a tunnel. This was made in 1890 - 91, the tunnel being inclined on a gradient of 1 in 3 with a track length of 152 metres (500 feet.) The vertical height is 52 metres (170 feet.)

The railway was originally powered by an Otto gas engine housed within a rock-cut chamber beside the top station, this first engine being replaced by a Tangye heavy oil diesel about 1922, and by an electric winder in about 1970.

Ron Martin of the Sussex Industrial Archaeology has recently reported on a survey, with measured drawings, of the engine room. Both text and drawings concentrate on the technicalities of the installed room and the fixtures and fittings, and it appears that the internal rock surfaces are not accessible to inspection.

Hastings has a second funicular railway, open to the sky, on its East Cliff.

Source: Ron MARTIN and Clem GILL, 2006, West Hill cliff railway, Hastings - engine room. Sussex Industrial History 36, 31 - 37.

NEWS - CONSERVATION AND HERITAGE

NAMHO Mining Heritage Guide - 4th Edition Published

The National Association of Mining History Organisations (NAMHO) is an association of societies, of which Subterranea Britannica is one, having an interest in the archaeology and history of mining. The Association was established in 1979 and currently has about 86 full members, as well as a number of affiliated organisations. It represents these bodies at National level, in connection with conservation, insurance, and other issues of mutual interest to the members. It also holds a weekend mining history conference each year, most recently hosted by the Shropshire Caving and Mining Club and the Shropshire Mines Trust at Llangollen. As usual, this conference included both lectures and visits programmes.

News

The 4th edition of the Mining Heritage Guide lists details of its constituent members, as well as details of other relevant organisations, and of museums relevant to mining history. It also includes some details of the Association's formation in 1979, and development in the following 27 years. The guide is available from NAMHO, c/o Peak District Mining Museum, The Pavilion, Matlock Bath, Derbyshire, DE4 3NR

<http://home.btconnect.com/SiliconDale/namho/>
Robert W. VERNON (edr.), 2006, Mining heritage guide. 4th edition. Matlock Bath: National Association of Mining History Organisations: viii + 123pp [ISBN 0-9517437-4-0]

Isambard Kingdom Brunet's Great Western Railway proposed for World Heritage Site status

I.K. Brunel's London Paddington to Bristol Temple Meads main line, built in 1836 - 41, has been proposed for World Heritage Site status. The 112 miles includes, as well as notable bridges and stations, nine of his tunnels between Chippenham and Bristol, of which Box tunnel (1 mile 1452 yards) and Middle Hill tunnel (198 yards) are especially noteworthy, and have been designated Historic Engineering Works by the Institution of Civil Engineers.

Source: Steven MORRIS, 2006, God's Wonderful Railway on track to be World Heritage Site. The Guardian, 7 July 2006, page 8.

Glenfield tunnel (Leicestershire) offered for sale

The Glenfield tunnel, made for the Leicester & Swannington Railway in the years 1830 - 32, was when opened the longest railway tunnel in the world. It is 1,796 yards long and lies between the former Leicester (West Bridge) and Glenfield (Desford) stations. Its single track bore is only 11 feet six inches wide, and was commenced under the direction of Robert Stephenson [1803 - 1859] by Daniel Jowett, William Clark, and Job Jowett. Daniel Jowett died as a result of falling down one of the ten construction shafts, but work on the west end of the structure was continued by his partners. The entire tunnel was completed by Messrs. Copeland and Harding of Leicester.

The line, and the tunnel, closed in 1966, and is currently up for sale by Leicester City Council, who had purchased it for £5 and have now agreed to spend three quarters of a million pounds on repairs. This historically very important tunnel is now accessible, with difficulty, from one end only - which end is not stated in David Lyne's report.

Source: David LYNE, 2006, East Midlands. Industrial Archaeology News 137, 12-13.

NEWS - SITE VISIT REPORTS

Caynton Temple, near Beckbury, Shropshire

This dramatic rock-cut subterranean folly or garden grotto was visited some years ago during the course of a Subterranea Britannica Study Weekend, and inspected again by Joep Orbons and Paul Sowan on 17th July 2006. It has been described, with photographs and a plan, by Steve Powell.

The temple, in Beckbury parish, is below the eastern rim of a shallow depression amongst trees, perhaps an old quarry, at SJ 775028 on the south side of the minor road leading eastwards from Ryton towards Albrighton. It is evidently associated with Caynton Hall about 250 metres away at SJ 778029, from which it is separated by an open field. A 'danger - subsidence' sign noted by Powell was not seen. The site is clearly well-known locally, as there is a clear pathway from the roadside, and there are numerous metal holders for nightlight candles underground.

The present entrance, somewhat less than a metre wide between red sandstone sides, leads by way of an earth slope dropping a couple of metres to the interior which is a veritable forest of closely-spaced rock-cut circular section columns. There may have been one or more further entrances to the right of this, as surface earth can be seen to have run in. The roughly circular main chamber has as its focus a rock-cut plinth or 'altar' about a metre across and half a metre high from which four separate columns, carved from the rock, rise to support the ceiling. A narrow walkway encircles this central feature, the outer edge of a part of which is separated by more rock-cut columns from a second concentric walkway at a slightly lower level forming a third of a circle, beyond which is a further such feature, the outer walls of which are further adorned with columns and niches, with some simple carved ornamentation and traces of previously existing cemented shell decoration. Leading off from the lowest of these three walkways is an inner circular room, two to three metres in diameter, with, again, decorated walls.

The interior has been deteriorated to a degree by the removal of shell decoration, and by modern graffiti.

According to the Victoria County History of Shropshire (Volume 10, 1998) Caynton Hall or House was built by one Yonge in 1803, perhaps on the site of a late 18th century farmhouse called

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Dennets Hays or Heys, and was reputedly styled on an earlier residence of W.J. Yonge, perhaps Pirbright Lodge in Surrey. The property was altered in the 1850s by a Col. Legge, and in 1977 the house was divided into three residences. This source describes the 'temple' as 'Cut into a disused quarry 250 metres west of the house. a small neo-Romanesque grotto with irregular ambulatories opening into inner sanctuaries. It is locally reputed to have been made by General Legge, but could be older. In the early 1980s it seemed to be in use for black magic rituals.

No evidence was seen or is known for a 'rumoured 'secret tunnel' from the Temple to the Hall.

Source: Steve POWELL, 2002, Subterranean Shropshire (Tempus Publishing Ltd), 59 - 61.

Lower Ceriog (or Ceirog) Cave, Bronygarth, Shropshire, west of Y Waun (Chirk), Clwyd, Wales

This small natural cave was described, with a plan, by Steve Powell, and was located and examined on 18th July 2006 by Joep Orbons and Paul Sowan. Powell's NGR and description of the location are misleading, in that they imply the cave to be just inside Wales, below the B4500 on the north side of the tiny Afon (River) Ceirog. The cave is in fact in Shropshire, England, just above the level of the river on the steep south bank, at SJ 264374.

It is approached by the unclassified road leading from Castle Mill, over the bridge via Bronygarth towards Weston Rhyn. Immediately to the east of Pen-y-Bryn are two pairs of large lime-kilns on the south side of the road, where there is space to park a car or two. The way down to the cave entrance is by way of a well-worn descent through trees (far too steep to call a path) which flattens out and turns eastwards alongside a limestone cliff just before the river is reached. At the time of our visit there was a crudely built 'log cabin' with the unsanitary remains of old furniture and a mattress inside or nearby. With a clean mattress it would make a pleasant and secluded resting place in the summer months.

The cave appears not to have enjoyed any human use, although it might quite possibly have been used for temporary shelter from inclement weather. A short hands-and-knees crawl leads after a few metres to a standing-height chamber with fallen rocks from the ceiling forming an uneven floor. Beyond this, according to Powell's description and plan, will appeal only to cavers who positively enjoy low and tight squeezes and plenty of mud. He notes that the cave is frequented by bats, so it should not be visited between September and April. Powell

gives references to several earlier descriptions.

Source: Steve POWELL, 2002, Subterranean Shropshire (Tempus Publishing Ltd), 59 - 61.

Quinta Temple and nearby tunnel, Weston Rhyn, Shropshire

Quinta Manse and Temple Wood are on the north side of the minor road from Weston Rhyn leading north-westwards towards Bron-y-Garth and Castle Mill (near Chirk Castle), on the south side of which lies Quinta Park. A public footpath, with an inconspicuous narrow opening in a hedge, leads north-westwards towards and through Temple Wood, on the east side of Quinta Manse. Just before the footpath enters the wood, the Temple can be seen at the far side of a field, at SJ 280364. This is a magnificent folly, having the form of a miniature Stonehenge, with standing stones, trilithons, and fallen stones. The stones, rather more slender in proportion to their lengths than the sarsens of Stonehenge, can be seen to have been cut by stitch-drilling, which presumably implies a fairly modern date for the structure.

The Temple is not noted by Barbara Jones in her *Follies & grottoes*, published in 1953. But it is mentioned under the name the Quinta Circle by Headley and Meulenkamp (pages 191 - 192) in the following terms:

Near Weston Rhyn -some slabs of stone are standing about in a field trying hard to pretend they are part of an ancient stone circle. In fact, they were put up by a Major West in 1830 - 40 to be seen from the nearby Quinta House. .. Perhaps the Quinta Circle was another example of squires trying to alleviate unemployment by devising labour-intensive projects.

Just after the footpath enters the woods, it traverses (or by-passes for those who prefer it) a short cut-and-cover tunnel at SJ 278363, the purpose of which is less than obvious. This is one of at least two such tunnels on this path, and the path is said to have been an existing miners' track, bridged over to take a carriageway from Quinta Hall in the 1800s.

HEADLEY, Gwyn, and Wim MEULENKAMP, 1986, *Follies: a National Trust guide*. London: Jonathan Cape: xxviii + 564pp [ISBN 0-224-02105-2]

Clive or Grinshill copper mine at Clive (SJ 5124), Shropshire

Clive copper mine was visited by Joep Orbons and his son, and Paul Sowan, with members of the Shropshire Cave & Mine Society, on 18th July, 2006.

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Clive is close to Grinshill, north of Shrewsbury, the location of the sandstone quarries from which much of the building-stone used in the county town was derived.

The mine is entered via a locked trap-door above a vertical shaft behind a stone wall alongside the road. This is approached by way of a footpath on the opposite side of the minor road, which passes below the highway in a short narrow rock-cut pedestrian tunnel with a bend in the middle. At a depth of about seven metres the shaft gives access to an approximately level roomy passageway in a worked-out stope within the mineral vein. This stope runs approximately parallel with the road, and has the lower ends of numerous shafts, blocked at the surface, in the ceiling. There is another such passageway at a lower level, running on much the same alignment. Whether or not the top passageway is on unworked rock left in situ, or on deads filling the stope above the lower passageway is not clear. In places it is necessary to scramble up or down one or two fairly steep rocky slopes.

At one point an open void extending a considerable depth to the lower level has to be traversed by way of technically easy but dauntingly exposed steps in the sandstone rock wall. This is passed safely by the use of fixed ropes and cows' tails. Joep's son (aged about 10) crossed this confidently, and your chairman followed nervously! Later on, a number of steep scrambles, up and down, and some hands-and-knees crawling is required through a partially back-filled area through which a low narrow access way has been left.

There are several small short trial tunnels approximately at right angles to the main way, presumably made in search of parallel veins of ore worth exploiting; it seems that no such veins were found.

Traces on the walls reveal that holes were drilled, and the rock blasted out with black powder. Black powder burn marks can be seen at the inner ends of these bores. In one of the blind cross-tunnels the working progressed from buff-coloured sandstone to barren red sandstone. It can be seen in this tunnel that fragments of red stone were blasted backwards and remain lodged in crevices in the tunnel ceiling in the buff stone.

The ore worked was malachite-impregnated sandstone, which was taken to the surface where the copper carbonate was leached out by the use of sulphuric acid. Copper metal was precipitated out of the resulting copper sulphate solution by the addition of scrap iron. No trace of the surface installations survives, although it is possible that the adjoining

woodland covers former spoil banks of leached sand. Similar ore was worked and treated in a similar way, on a much larger scale, at the celebrated Alderley Edge mines in Cheshire.

Apart from its technical mining interest, this is a colourful place to visit. There are still thin films of malachite on the stope walls (but little if any malachite-impregnated stone), and some spectacular iron-staining Liesegang rings in the sandstone country rock.

NEWS - HEALTH & SAFETY

Cave digger killed in Derbyshire

The first caving fatality in Derbyshire for 15 years occurred on 25 March 2006 when David Briggs (37) was killed when a large rock fell on him. He was excavating a side passage from the bottom of a five metre deep shaft, and was pronounced dead at the scene of the accident. His body was recovered seven and a half hours later with the assistance of a mechanical excavator.

Source: ANON, 2006, Cave digger killed in the Peak. Descent 190, page 6.

Dangers of digging

Brian Spink (46) of Murton, County Durham, died of asphyxiation as a result of a fall of soil as he was digging for antique bottles to add to his collection of 3,000 examples at the foot of a Victorian refuse tip shortly before midnight on New Year's Eve 2005. A fellow prospector found his body the following morning.

Source: ANON, 2006, Inquest: antique bottle collector killed by soil collapse. The Guardian, 15 April 2006, page 12.

Underground-related cave rescue incidents in 2005

The annual report on cave rescue incidents issued by the British Cave Rescue Council includes details and an analysis of 117 occasions when cave rescue teams were called out at underground sites of all kinds, the majority being natural caves, but including disused mines, and even culverts.

Seven call-outs on behalf of the police or other authorities were to assist with searching for missing persons in areas where they may have fallen or wandered into holes, although none were found underground. There was a team on stand-by after the London terrorist bombings, although the members were not called into action. Five dogs, five

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lambs and four sheep were amongst the victims. In nine call-outs persons were reported lost or overdue, although all were found and assisted to the surface where needed and suffered no harm.

The genuine emergencies included three persons physically exhausted and unable to climb out, three people who were physically stuck, and one person who was injured by a falling rock. Three people suffered falls, and one member of the public was assisted from a show cave. Four people were actually injured in accidents underground.

There were two fatalities below ground. A cave diver drowned whilst negotiating a sump in Low Birkwith Cave in Ribblesdale. And a 14-year-old boy died after being trapped by unexpectedly rising floodwater at Manchester Hole, Nidderdale, during the course of an outdoor pursuits centre supervised visit.

Source: BRITISH CAVE RESCUE COUNCIL, 2006, The rescues of 2005. Descent 190, 30 - 32.

Reading Chalk Mines a Continuing Cause for Concern

Investigations continue in the Castle Hill / Coley districts of Reading, west of the town centre, where properties in Field Road were badly damaged by mining subsidence in 2000 and following years.

Investigations have been conducted by Peter Brett Associates, and others, and have included a desk study of available records for the district, the drilling of boreholes to detect voids, and the use of down-hole cameras to record the cavities found. None of the mine-workings have been entered. Treatment of the area immediately affected was by filling via a closely spaced grid of boreholes. Current investigations are geared to determining the further extent of un-recorded mine workings in the adjoining areas.

The Coley area was, in the 18th and 19th century, one of brickfields with associated chalk mines below the open clay pits. Removal of much of the clay cover has naturally allowed rainwater to percolate downwards through the chalk, weakening the mine ceilings and pillars. There was a similar scenario on the opposite (eastern) side of the river Kennet in the Katesgrove area, although in this locality, where there is good evidence that some chalk mining has also taken place, there has been less subsidence, at least in recent years.

Brickfields are shown in the Coley and Katesgrove districts on several early large-scale maps, and the Reading Board of Health's map of 1865 has a shaft clearly marked at what is now Field Road.

As the chalk mines appear to have been abandoned before the coming into force of the provisions of the Metalliferous Mines Regulation Act, 1872, there are few formal records relating to them. In fact the only explicit published reference to mines at Coley is in a footnote to a paper by T. Rupert Jones and C. Cooper King, published in 1875, which reads:

We have been told that at the Castle-Kiln pit, now disused and partly built over, extensive underground excavations in the chalk were formerly carried on.

Source: Clive EDMONDS, 2005, Reading field trip day. Identification of geohazards in the urban environment: a field study workshop at Reading. Saturday, 12th November 2005. Trip organised for Open University Geological Society. [Dossier of maps and text]

Source: T. Rupert JONES and C. Cooper KING, 1875, On some newly exposed sections of the "Woolwich and Reading Beds" at Reading, Berks. Quarterly Journal Geological Society of London 31, page 451.

Source: Lucy THORNE, 2006, Mine zone families await news of how Council will pay for multi-million-pound surveys. Counting the cost of mine workings cave-in risk. Reading Chronicle, 6 July 2006, page 8. Houses collapsing in Bromley, SE London - 'natural causes' not mining subsidence?

A brief mention on the lunchtime television news in April of ground subsidence and collapsing houses in Bromley led to speculation concerning the likely location and cause of this problem. Within the London Borough of Bromley there are certainly chalk mines at Camden Park, Chislehurst (the famous 'Caves') and Pratts Bottom.

More detailed information in Bromley's local papers indicates that the subsidence was in Ridley Road, which runs along the north side of the main railway line a little to the east of Bromley South Station. Trains, including Eurostar services to and from Brussels and Paris, were slowed down, cancelled, or diverted, over this section of line whilst investigations were undertaken to assess the likelihood of further subsidence which might affect the railway. The geology here is of river gravels overlying Thanet Sand, with chalk at some depth. Deneholes seem not to be recorded in this locality, and current thinking is that the subsidence is probably an entirely geological question.

The subsidences commenced at around 4 am on the morning of 11 April, when the front wall of a three-bedroom semi-detached house started to collapse. A large part of the house fell into a pit which had

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opened up in the front garden. People were evacuated from 14 properties, and later from another six, while investigations were put in hand. By 26 April four homes (one of which had not been insured) were scheduled to be demolished on safety grounds.

Sources: Louise TWEDDELL, 2006, Shocked by collapse: residents evacuated as house crumbles. Bromley News Shopper, 12 April 2006, page 1; Louise TWEDDELL, 2006, Three homes set to be demolished. Bromley News Shopper, 19 April 2006, page 5; ANON, 2006, Families' homes destroyed; demolition of homes begins. Bromley News Shopper, 26 April 2006, pages 1 and 5; Kate MEAD, 2006, Sudden house collapse caused by chalk void. Kentish Times [Bromley], 29 June 2006, page 6.

Stirling - Alloa - Kincardine Railway Reopening, Scotland

Much of the coal for Longanet power station reaches it by rail via the Forth Bridge and Dunfermline, a somewhat roundabout and congested route. A more convenient route is now about to be reopened via Stirling and Alloa, with passenger services restored, also, between those two places. Shallow coal workings on a part of this long-closed railway line are being identified and stabilised.

Source: John SULLY, 2006, Stirling-Alloa-Kincardine on time and on budget. Modern Railways 63(692), 14 - 15.

The Dounreay Nuclear Waste Disposal Shaft and Tunnel, Caithness, Scotland

A 65m deep vertical shaft communicating with a lateral tunnel was used at the Dounreay nuclear power station on the Caithness coast for some years for the disposal of intermediate-level radioactive waste. Discharging this material direct to the sea became unacceptable, and as materials of all kinds (including it seems metallic sodium) appear to have been dropped, unrecorded, down the shaft it is perhaps not surprising that it has become a cause for concern. An explosion occurred, for example. And it is rumoured that the material in the now blocked shaft includes a JCB!

Quite apart from the direct discharge into the sea via the tunnel, the host rock here is a permeable sandstone, so the likelihood is that radioactive waste has leached laterally into the local groundwater. A site investigation exercise some years ago set out to collect data to measure the rate of sea-cliff erosion here, and thus to allow it to be calculated how many years it would be before landward recession of the cliff-line would expose the shaft contents to marine weathering and dispersal. The half-lives of some of

the radio-nuclides in the waste are so long that such relatively slow geological phenomena become of important for long term safety and security.

Removal of materials from the clogged shaft commenced in 1988, and there are now plans in hand to prevent any further interaction of the contents with the local groundwater. These envisage the injection of a 'curtain' or barrier of grout into the pore spaces in the surrounding sandstone, around and below the shaft and tunnel.

Source: Jon YOUNG, 2006, Tests force change to Dounreay curtain. New Civil Engineer, 25 May 2006, 12 - 13 and 46.

Committee on Radioactive Waste Management (Corwm) Opts for Burial

The Committee on Radioactive Waste Management has presented its report to the UK Government on the management of British radioactive waste, recommending 'geological disposal.' It has been argued that retention of waste in surface structures presents greater and unacceptable risks, as a result of possible climate change, sea-level rises, and the threat of terrorist attacks.

Source: ANON, 2006, CORWM opts for burial. Geoscientist 16 (6), page 10.

NEWS - MILITARY AND COLD WAR

Bunker-Busting Tests

What seems likely to be the biggest controlled conventional explosion in military history was scheduled to take place in the Nevada desert on 2 June 2006. The intention was to detonate 635 tonnes of high explosive, and to test the impact of 'bunker-busting' bombs on underground targets.

Source: Julian BORGER, 2006, Pentagon plans record-breaking explosion in Nevada desert. The Guardian, 1 April 2006, page 18.

'Nuclear bunker' at Tendring (Essex) on sale for £ 50,000

What is described as a 1950s Cold War 'nuclear bunker' at Tendring (Essex) with access by way of a 5 metre vertical ladder, complete with a periscope and a surface lookout, is offered for sale at £ 50,000 by agents Robinson Hall.

(The bunker sold for a little over £30,000 -NC)

Source: ANON, 2006, Going underground. London Metro, 1 June 2006, page 15.

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National Trust to open Reigate Fort to the public Summer 2006

Reigate Fort, an 1890s anti-invasion structure at the top of the Chalk escarpment to the north of the town, is to be opened to the public from mid-June 2006, following restoration and the creation of explanatory displays by the National Trust. The fort, a Scheduled Ancient Monument, was sold by the War Office a century ago, and is one of 13 built in an arc protecting the south-eastern approaches to London, extending from the Essex coast of the Thames Estuary to the North Downs escarpment in parts of Kent and Surrey as far west as Guildford.

Gates and railings, metal window fittings, and internal oak doors have been restored, and health and safety issues addressed. The work was supported financially by Biffaward, the Heritage Lottery Fund, and Norwich Union.

Access to the underground parts of the fort will be 'limited to special occasions or by appointment.' More information can be obtained by calling 01372-220640.

Visitors can reach the fort on foot from the Wray Lane car park at the top of Reigate Hill by heading westwards via the footbridge over the A217. The fit and energetic can walk from Reigate Station up the A217 (not pleasant) up Reigate Hill, taking a short cut to the fort up a steep footpath (much pleasanter) from the point where the road bends to the east. And there are local buses.

Source: ANON, 2006, Reigate Fort revealed. National Trust South East News, Summer 2006, page 3.

Ordnance Survey to reveal secret sites

The precise locations of dozens of secret military and spy bases are to be revealed on Ordnance Survey maps for the first time, ending one of the last remaining legacies of the Cold War.

For decades, tourists and ramblers have stumbled across secret radar bases, nuclear bomb stores and rocket testing ranges tucked away in quiet woods or remote hillsides because they had been "airbrushed" out of even the most detailed official maps.

But the Government's security chiefs have quietly abandoned that policy by scrapping its list of secret military and intelligence facilities – known officially as the 'sensitive sites register'.

The decision was made earlier this year by the

Cabinet Office but never formally announced; it acknowledged that the internet had defeated its attempts at secrecy.

Aerial and satellite photographs of the country are available on the internet, while web-based mapping services such as Multimap are competing directly with Ordnance Survey (OS). The change in policy means the last remaining 50 sites on the register - including the nuclear warhead factory at Burghfield in Berkshire - will now be marked on all the maps printed by OS.

The obsession with secrecy, which deepened once spying by the Soviet Union intensified during the Cold War, has been relaxed recently. The 'sensitive sites register' has been slowly whittled down and OS has begun including some sensitive sites on its most detailed Explorer series of maps, but anomalies remain.

In western Scotland, buildings and railway tracks for Glen Douglas armament depot near Faslane nuclear submarine base are marked but unnamed on the most detailed Explorer maps, but are 'airbrushed' out of the larger-scale touring maps. A rocket testing range in Wyre Forest near Kidderminster, Worcestershire, is shown by an unnamed rectangular field in the detailed maps, but omitted in all large-scale maps.

Some of the most sensitive sites will still not be named or will have misleading labels such as 'disused airfield' or 'depot'.

Source: The Independent on Sunday, 6/8/2006

NEWS - MINING

Harworth Colliery (Yorkshire) to close

Harworth colliery, near Doncaster, is to be closed by its operators UK Coal after a productive life of some 80 years. Three hundred persons will lose their jobs.

Source: ANON, 2006, Black day: Harworth colliery to close. The Guardian, 13 June 2006, page 25.

The introduction of electrical equipment into British coal mines: a study

A recently published paper examines the history of the recognition of the relative importance of firedamp (methane) and coal dust as the materials responsible for explosions in coal mines, and of the research and design necessary to allow the safe introduction of electrical equipment in coal-mining from about 1880 onwards, through to about 1930.

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Until researches into the role of coal dust as an explosive agent, in France from 1855 onwards, it was generally assumed that methane was the principal danger. This line of enquiry was taken up in England in 1873 - 75 by William Galloway, who had observed that explosions were commoner in dry (and dusty) mines than in wet ones. In 1880 he succeeded in inducing an explosion of coal dust, in the absence of methane, in an experimental test chamber. However, universal recognition and acceptance that coal dust was the more important factor, with methane having a subsidiary role as a 'primer' in colliery explosions, was slow in developing. The Atkinson brothers, both Assistant Inspectors of Mines, published their work *Explosions in coal mines*, in 1886, including a discussion of the role of dust, but unfortunately this work was suppressed and withdrawn. The Coal Mines Regulation Act, 1887, made it a requirement that dusty mines should be watered before shot-firing, but it was not until 1906 that a Royal Commission was established to examine the coal dust question. The Commission, in its 1908 report, recommended watering or the use of stone dust to reduce the risk of coal dust explosions. Galloway's work of 1880 was at last confirmed in 1910.

The paper also examines the evolution of electrical equipment which could be used safely underground at collieries. Sparking at the brushes of DC motors was seen to be the main problem, and at first wire mesh cages (following the example of the Davy lamp) enclosing the relevant parts of the equipment were used. However, these could become clogged by coal-dust, which, if ignited, could raise the temperature of the mesh to such an extent that dust and / or methane outside the enclosure could be ignited. Complete enclosure within metal casings was later developed.

The author concludes that had there been a central or governmental coordinated research programme at a much earlier date, much safer working of electrical equipment in mines would have been achieved at a much earlier date.

Source: Alan Victor JONES, 2006, *Towards safer working: the hazards and risks of introducing electrical equipment in British coal mines up to about 1930*. *Trans. Newcomen Soc.* 76(1), 115 - 126.

Successful rescue of two Australian gold miners trapped almost 1,000 metres below ground in Tasmania

An earthquake of magnitude 2.1 resulted in a rockfall almost 1,000 metres below ground level in a gold mine at Beaconsfield, Tasmania, on 25 April 2006.

One man, Larry Knight (44) was killed, and two more, Todd Russell (34) and Brant Webb (37) were trapped inside a steel safety cage about two metres long, 1.2 metres wide, and 1.5 metres high. Astonishingly effective surveying and mining techniques allowed the trapped men's exact position and condition to be ascertained, and a 12 metre long 0.1 metre diameter borehole made to ensure air, fresh water, food supplies and intercommunication. Subsequently, a metre-wide escape tunnel (from an undamaged part of the mine complex) was driven to the location of the safety cage. The last few metres of this had to be driven agonisingly slowly, to avoid bringing down further rockfalls. The temperature underground here was about 25 °C.

The two survivors were brought to the surface, psychologically and physically incredibly fit and well in the circumstances, at about 5 am local time on 8 May. They expressed a wish to attend the funeral of their less fortunate workmate, a few hours later.

Sources: Rick RYCROFT, 2006, *Trapped miners given iPods to ease tension of rescue effort*. *The Guardian*, 4 May 2006, page 24; ANON, 2006, *Australia: miners' rescue delayed by seam of hard rock*. *The Guardian*, 8 May 2006, page 26; Duncan CAMPBELL, Alex KUMI, et al., 2006, *International: rescue team frees Australian miners. Nation celebrates: public was gripped by fate of men who had been feared dead. After 14 days trapped underground, Australian miners walk to safety*. *The Guardian*, 9 May 2006, pages 1 and 23.

Norilsk Nickel and Rio Tinto Joint Venture Agreement

Norilsk Nickel, based in Moscow, signed a joint venture agreement with international mining concern Rio Tinto in January 2006, with a view to joint exploration and exploitation of mineral reserves in a vast swathe of Siberia, stretching from the Kazakhstan border to Vladivostok on the Pacific coast, a mountainous area lying to the north of Mongolia and NE China. At 4,000 kilometres from east to west, this area crosses four time zones, and is as large as Western Europe, with mountains up to 4,500m high. It is as yet under-explored and under-exploited, although the Russians have already laid in the Baikal - Amur Railway (branching off from the Trans-Siberian) which would play an important part in any mining developments.

Norilsk Nickel is the World's leading producer of nickel and palladium, and one of the largest producers of platinum. It also mines significant quantities of cobalt, copper, gold, selenium, silver, tellurium, and deals also in coal and sulphur. There is the prospect of useful deposits of molybdenum in

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the agreement area.

Source: ANON, 2006, Destination Russia. Rio Tinto Review 78 (June 2006), 4 - 8 Thanks to John Collett.

NEWS - MISCELLANEOUS

Access issues

Alan Jeffreys, of the Grampian Speleo Group, comments on what he sees as the scourge of 'political correctness' and nanny health and safety regulations in a letter to Descent issue 190. In the same issue Katie Lloyd reports that access to the underground stone quarries at Box (Wiltshire) is being prevented by the fitting of steel grills, and that the lead mines at Cwmystwyth in mid-Wales are being rendered inaccessible by steel fencing which, additionally, is potentially damaging the archaeology of the mine sites and detracts from the aesthetic qualities of the mountain landscape. What arrangements, if any, may be made for continued access at Box or Cwmystwyth have yet to be clarified.

Source: Martyn FARR, 2006, Cwmystwyth mines grilled. Descent 190, page 22.

Source: Alan L. JEFFREYS, 2006, How times have changed. Descent 190, page 36.

Source: Katie LLOYD, 2006, Box access. Descent 190, page 10.

Amateur tunneling in Hackney, East London

William Lyttle, aged 75, has spent 40 years tunneling underneath his home in Hackney. His activities now having come to the attention of the authorities, he has reportedly been 'banned from his home' as the result of proceedings in the Thames Magistrates Court. His sixty feet of tunnels are to be filled-in on health and safety grounds.

Source: ANON, 2006, Court does not dig Mole Man. Evening Standard Lite, 1 August 2006, page 7.

Robert the Bruce's cave Scotland or Northern Ireland?

Robert the Bruce [1274 - 1329] ruled as King of the Scots from 1306 until his death. He lost and won a number of battles, but famously triumphed over the English at Bannockburn, near Stirling, in 1314. His resolve in the face of adversity is said to have been the origin of the advice that 'If at first you don't succeed, try, try, and try again,' popularised by one William Edward Hickson [1803 - 1870] a British educator and writer.

Bruce was supposedly inspired by this thought whilst

sitting in a cave watching a spider patiently making a number of attempts, ultimately successful, at making a web.

Various land-owners have sought to identify this historic cave as on their own property. The four leading contenders are:

(1) Bruce's Cave in a riverside sandstone cliff at Kirkpatrick-Fleming near Gretna in Dumfriesshire;

(2) King's Cave on the west coast of the Isle of Arran;

(3) Uamh-an-Righ [King's Cave] near Loch Voil, 3/4 miles west of Balquhidder, Perthshire;

(4) A cave on Rathin Island off the Antrim coast of Northern Ireland;

The Earl of Elgin, a descendent of Bruce, favours the Irish option, on the grounds that the site was owned by Bruce's Irish mother.

Source: ANON, 2006, Finding Robert's cave. Descent 190, page 7.

Underwater, if not underground

Whilst the published work of Brian W. Adams [1924 - 2005] has no directly subterranean relevance, it is of interest in that (1) he was concerned professionally, as a mathematician with the Hydrographic Department of the Admiralty, with the accurate charting of subsurface (in this case underwater) features; and (2) his work is almost required reading for serious users of Ordnance Survey maps and plans, and especially for those engaged in surveying. His works, mostly published in the periodical Sheetlines issued by the Charles Close Society for the Study of Ordnance Survey Maps, are most readable presentations of the mathematics of map projections and scales, and other related topics. And the work is full of quirky facts, such as the existence of not one but three Greenwich Meridians! And quirky discussions, as of how many islands there are in the British Isles! The answer depends, of course, on the definition of an island, the states of the tides, and (as it is not high or low tide simultaneously throughout our surrounding seas) the time of day. Small islands disappear at high tide, and single islands become two or three. Some islands become part of the mainland at low tide. and what about islands in estuaries, rivers, and lakes? Another quirky discussion concerns the 23 isolated parts of the former Scottish county of Cromarty - the main county, and 22 detached portions entirely surrounded by the former county of Ross (Ross and

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Cromarty were subsequently united as a single county in 1889.) The county town, Cromarty, was not in the largest portion of the county, either! All very readable and entertaining, as well as informative, and a splendid source of odd facts to bring forth to entertain your friends.

Source: Roger HELLYER and Chris HIGLEY (eds), 2006, *Projections and origins: collected writings of Brian Adams*. London: Charles Close Society: iv + 116pp [ISBN 1-870-59826-1]

Gypsum caves and mine near Chortkiv, Ternopil Oblast, Ukraine

Our good friends in the Speleo Club Crystal at Chortkiv, about 50 miles south of Ternopil, have sent us a copy of the 2005 edition of *Welcome to Ukraine*, a very professionally produced and unusually well written publication for English-speaking visitors. This includes an illustrated article on the Mlynki caves near Chortkiv, which your Chairman was privileged to visit, with members of Speleo Club Crystal, some years ago. The name Mlynki derives from the sometime mill on a nearby stream. Gypsum was mined here on a very small scale in the 19th or early 20th century, but it was not until a schoolboy and, later, one of his teachers explored a rift in the ground that the immense network of natural gypsum caves was discovered, one of several in this area of Ukraine. The caves, all on one level and without running water, offer an exhilarating series of scrambles and crawls, and are lined throughout with fantastic natural gypsum crystals.

Source: Olena KRUSHYNSKA, and Volodymyr UDOVYCHENKO, 2005, *Wonders of the underworld. Welcome to Ukraine*, 2005, 60 - 63.

Svalbard (Spitzbergen) International Seed Vault

Conventional seed-banks rely on artificial refrigeration to preserve the genetic information stored in seeds. That in turn, obviously, relies on continuity of power supplies, or of fuel supplies to operate stand-alone generators. The Norwegian Ministry of Agriculture seeks to eliminate that reliance by creating a seed vault in a reinforced concrete tunnel driven 70 metres (230 feet) into a mountainside within the permafrost zone near Longyearbyen in Svalbard (Spitzbergen) approximately 620 miles from the North Pole. The tunnel will be guarded by two steel doors remotely controlled from Sweden. Seeds will be stored in foil packets at minus 18 degrees Celsius, and are expected to remain viable for thousands of years. Because of the location in permanently frozen ground, the bank will remain below freezing point

even if all its electrical systems fail. Three million samples will be stored; from 'every country in the world' although it is not reported how many species or varieties will be represented. The report seems to imply that the emphasis will be on economically valuable crops ('crucial seeds'), rather than on genetic diversity as such. The Global Crop Diversity Trust is associated with the scheme. It is expected that the bank will accept samples from 2007 onwards.

In the event of crops, and local seed banks, being lost through global catastrophe or war, replenishment from the Svalbard bank could allow their re-establishment. Genetic diversity is being lost already, as a result of current cultivational regimes. Of 7,100 species or varieties of apples found in the USA in the 19th century, 6,800 no longer exist.

The £ 2.6m project was launched recently by the Prime Ministers of Norway, Sweden, Finland, Denmark and Iceland at a meeting at Longyearbyen, which is also home to Norway's only coal mines, and to Russian-operated coal mines as well.

Source: Alok JHA, 2006, *Deep in permafrost - a seed bank to save the world*. Project aims to protect global food supplies. Three million samples to be housed in giant vault. *The Guardian*, 20 June 2006, 16 - 17.

NEWS - PUBLICATIONS

Nottingham's caves

A new edition of an illustrated A4 booklet (first published in 1977) describing Nottingham's 'caves' has been published by the Nottingham Civic Society. It contains a handy map of the city centre, indicating the locations of sites, and includes details of which can be visited and contact details.

There are historical notes, photographs (some in colour) of scenes above and below ground, plans and sections. The front and back covers also carry striking colour photographs. Sites described range from medieval 'caves' and cellars, 'Mortimer's Hole' at the Castle, 'rock houses', and post-medieval 'caves' through to 18th - 19th century sand mines, wells, and the spectacular rock-cut Park road tunnel made in 1855 (probably England's fourth such) through which there is a pedestrian right of way, although the upper end is not easily spotted below and behind a modern office block.

Recommended further reading includes Tony Waltham's *Sandstone caves of Nottingham*, SB member Alan MacCormick's paper on Nottingham's underground maltings and other medieval caves in

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the Transactions of the Thoroton Society, and Chris Drage's on Nottingham Castle in the same journal.

Source: Andrew HAMILTON, 2004, Nottingham's caves. Nottingham Civic Society Sales Ltd: 40pp [ISBN 1-902443-10-1] [Available at £ 3.50 at the bookshop at Nottingham Castle]

Fatal accidents in Shropshire mines 1850 - 1979

A new publication issued by the Shropshire Caving and Mining Club, authored by Dr. I.J. Brown, lists details of recorded accidents in Shropshire's mines for coal, ironstone, clay, fireclay, limestone, pyrites, lead, and barytes, primarily from official records, for the period 1850 to 1979 when the last operating deep mine (the Granville colliery) closed.

Ivor Brown's father, John Henry Brown, had worked in the Shropshire collieries, as did Ivor himself before being professionally engaged in connection with remediation works in the mining landscape that was replaced by Telford New Town. He later went on to serve as Minerals Officer for West Yorkshire.

Although essentially a compilation of dates, names of collieries, names of the persons killed, and causes of death, the booklet contains much additional detail, including extended accounts from local newspapers or other sources of some of the more serious accidents such as those at Grange Pit (1861), Wrockwardine (a stone pit) (1861), Lilleshall Colliery (1862), the Dark Lane Pit (1862) and numerous others. Some maps and sections are included, and photographs.

The victims included women and children, and the causes of death included gas explosions, falls of roof, entanglement in moving machinery, persons crushed by moving wagons, explosions of gunpowder, cage ropes breaking, persons falling down shafts, suffocation by mine gases, a boiler explosion, over-winding, and injuries inflicted by horses.

Other information includes some mineral production statistics for coal, ironstone, fireclay, red clay, and pyrites in 1901, 1906 and 1911. There is a short section devoted to fatalities in metalliferous mines from 1875 onwards, including the Snailbeach mine where lead and barytes were raised.

Appendices include glossaries of mining terms, a chronological list of multi-fatality disasters, and indexes of mine and personal names.

Source: Ivor J. BROWN, 2005, Fatal accidents in Shropshire mines from 1850 - 1979. With some

details of the major incidents. Shropshire Caving and Mining Club Account 24: 87pp [Available for £ 7 inclusive of postage and packing from Moore Books at www.moorebooks.co.uk/mike@moorebooks.co.uk Mike Moore, 53 Vineyard Drive, NEWPORT, Shropshire TF10 7DF]

Mining History [Bulletin of the Peak District Mines Historical Society] for Winter 2004 published (Summer 2006)

The issue of Mining History 'for winter 2004' was delivered to members of the Peak District Mines Historical Society in July 2006. This issue bears no actual date of publication, although there is a reference on page 34 of an item published in 2005. It has to be concluded that the actual date of publication in 2006. One might reasonably expect the publishers of serious mining history to print the correct date of publication on their works.

The contents are as follows:

CRESSEY, M., J. PICKIN, and K. HICKS, 2006, The Silver Rig, Pibble and Woodhead metal mines, Galloway, Scotland. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 49 - 62 [This paper reports on the results of topographical surveys of three lead mine sites in Dumfries and Galloway, and presents an audit of the surface archaeological remains, with detailed plans, elevations of remains of standing buildings, and surface photographs.]

FORD, Trevor D., 2006, Geology of the lead mines around the Stanton syncline. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 1 - 26 [Derbyshire: Carboniferous limestone host rock for lead, zinc, baryte and fluorite mineralisation. The area described extends east-west from the river Derwent to Middleton, and south-north from Winster to just short of Lathkill Dale. The paper includes geological maps and sections, some underground photographs, and other illustrations]

HEATHCOTE, Chris, 2006, Lead / calcite working in the Deep Dale and Bullhay Dale area, near Chelmorton, Derbyshire. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 27 - 34 [Reviews documentary evidence for veins and mines worked for calcite and lead ore, and includes five surface photographs shewing mine entrances.]

KIRKHAM, Len, 2006., Astbury hydraulic lime works, Newbold, Cheshire. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter

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2004], 58 - 72 [Includes an extract from A.M. Henshaw (1911), Report on Astbury lime works. There are mines in the area for coal and brick-marl as well as for limestone. The paper reports the results of investigations underground in the mines, and includes underground photographs.]

SIEMS, P., and Jack SULLIVAN, 2006, The Schlackenwald, Bohemia, mining law of 1548. Translated from Middle High German ... Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 35 - 45 [The text relates to a tin-mining district and contains information on working conditions, mills and smelters, and some aspects of life in the mining community.]

SLACK, Ron, 2006, Women and the lead trade in 17th century Wirksworth, Derbyshire. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 46 - 48 [Significant numbers of women had an interest in the lead industry at Wirksworth in the 17th century, as owners, shareholders, ore-buyers, and workers.]

WILLIES, Lynn, 2006, Rio Tinto revisited. Mining History [Bull. Peak District Mines Historical Society] 15(6) [for Winter 2004], 63 - 67 [Reviews the current state of the Rio Tinto mine site in Spain, and suggests that World Heritage Site or Geopark status would be appropriate. There is now a railway and mining museum at the site.]

[Copies of this issue of Mining History, and back copies, are available from Mike Luff, The Coppins, Wash Lane, RAVENSTONE, Leicestershire LE67 2AZ (Telephone 01530-810905) The Society's web site is <http://www.pdmhs.com>]

NEWS TUNNELS AND TUNNELLING

New underground works at Shepherd's Bush Station (London Underground Central Line)

Shepherd's Bush Station, on London Underground's Central Line, is being equipped with two new shafts and additional sub-surface pedestrian tunnels to cope with expected increased passenger flows on the opening of the 40 acres White City retail development, one of the largest such in Europe. A new White City Station is being built, and a 16-road sidings complex re-located westwards to what will become the basement of the new complex. The remains of the former Wood Lane Station (closed in 1947) have been removed. It seems that a London Underground oddity will survive the changes - transposition of the eastbound and westbound running lines westwards of Shepherd's Bush. To the west of the station, the westbound line (in tunnel)

passes above the eastbound line (in a lower-level tunnel) by way of the very tight Caxton curve (the tightest radius curve on the system.) It passes back over the eastbound line (on the surface) in the neighbourhood of Wormwood Scrubs on the way to East Acton.

Source: James ABBOTT, 2006, Railways reshaped for retail emporium. Modern Railways 63(693), 58 - 61.

Second road tunnel under the Tyne to commence construction in 2007

The construction of a 2.6 km two-lane road tunnel under the Tyne is expected to commence in autumn 2007. The central 360m will be an immersed tube design, with cut-and-cover approaches at each end.

Source: ANON, 2006. Second Tyne Tunnel sees off legal challenge. New Civil Engineer, 11 May 2006, page 11.

Docklands Light Railway extension via two new tunnels from King George V Dock to Woolwich Arsenal commenced

The Docklands Light Railway (London) is being extended from King George V Dock to a new DLR Station alongside the existing Woolwich Arsenal Station. There will be two parallel single-track tunnels, both bored from the northern bank. A novel design of six metres diameter earth pressure balance tunnel-boring machine was assembled in its launch pit on the north bank in April 2006, and has now commenced boring southwards. It is expected to complete the 1.8 km bore by September 2006, removing in the process 104,000 m³ of spoil. It will then be shipped back to the north bank to commence the second bore.

The machine has been designed to bore through alluvium and river terrace deposits, Thanet Sand, and water-laden fissured flinty chalk. Predicted water pressures at the deepest point, 35 km below the bed of the Thames, are 3.5 bar. Although provision for working in compressed air is being made in case of necessity, it is hoped that this will not be needed. The line is expected to open in 2009.

The DLR Woolwich Arsenal extension tunnels are the fourth new rail crossings below the river in east London in ten years: Two bores each for the Jubilee Line extension to Stratford and the DLR extension to Greenwich and Lewisham opened in 1999. The Channel Tunnel Rail Link under-Thames tunnels were completed in 2005, and are expected to be opened to traffic in 2007.

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Sources: ANON, 2006, New rail link under the river Thames. *Railwatch* 108, 10 - 11; Andrew MYLIUS, 2006, DLR Thames tunnel works begin with innovative TBM. *New Civil Engineer*, 11 May 2006, 10 - 11.

National Water Grid advocated

Engineers have advocated a National Water Transfer scheme under a new independent national water authority, linking regional water resources via canals, rivers, pipelines and tunnels.

Source: Bernadette REDFERN, 2006, Don't rule out a national water grid, warn UK engineers. *New Civil Engineer*, 29 June 2006, page 6.

Tunnelling in connection with the new Hauptbahnhof in Berlin, Germany

The main line to and through the centre of Berlin has since 1882 been the Stadtbahn running from west to east on viaduct. The principal stations on this, serving the city centre, have been the Zoologischer Garten, Lehrter, Friedrichstrasse, Alexanderplatz and Ost stations.

There is now also a newly built north-south line running right through the city, partially in bored and cut-and-cover tunnels. This passes below the Stadtbahn lines at the site of the former Lehrter Station, where Berlin's new five-level central station, Berlin Hauptbahnhof, has been built. It opened to passengers on 28 May 2006. The lowest two levels are below ground. The Stadtbahn lines are served by two island platforms 405 metres long on the uppermost level (10 metres above ground level), where there is also a 100 metre island platform for S-Bahn (local) trains. Fifteen metres below ground level the north-south line has four 405 metre platforms.

The three intervening levels contain offices, services, shops, and all the things to be expected at a city-centre station. The new station is liberally provided with interchange facilities for other transport modes, and includes underground car-parking, and connections from the 2.45 km Tiergarten road tunnel built from 1995 onwards and opened earlier this year. A 60 metre high 'chimney' at the new station is in fact the air intake and exhaust for the road tunnel and sub-surface parking space. Internal transfers between the five station levels are achieved by 54 escalators, six 'panoramic' and ten ordinary passenger lifts, and five flights of stairs. Additionally, there are seven goods lifts, and another nine lifts reserved for the use of staff and emergency services.

Source: John GOUGH, 2006, Berlin's new railways. *Modern Railways* 63(693), 63 - 70.

New double-track tunnels for eastern approaches to Prague's main station (Praha Hlavni Nadrazi), Czech Republic

A new eastern approach to the main central station in Prague (Praha Hlavni Nadrazi) is expected to be completed by 2008, and will incorporate two new double-track tunnels. One of these new tunnels was broken through on 23 May 2006, when Transport Minister Milan Simonovski detonated 42 kg of dynamite to remove the last remaining rock between the two tunnel headings, commenced in 2005.

Source: Quintus VOSHAN, 2006, Prague tunnel breakthrough. *Modern Railways* 63(694), page 60.

Proposed road tunnel on the A303 to by-pass Stonehenge (Wiltshire): further discussion

Salisbury District Council has voted to ignore the Government's schemes to cap the costs of by-passing Stonehenge, and to continue to support the original 2.1 km £ 510m bored tunnel option. It is argued that only a deep bored long tunnel, passing below the archaeologically sensitive area, is acceptable on conservation grounds. A by-pass in open cutting to the north or south, a shorter tunnel, or a cut-and-cover tunnel, all cheaper options, would inevitably destroy much of the archaeological potential of this World Heritage Site.

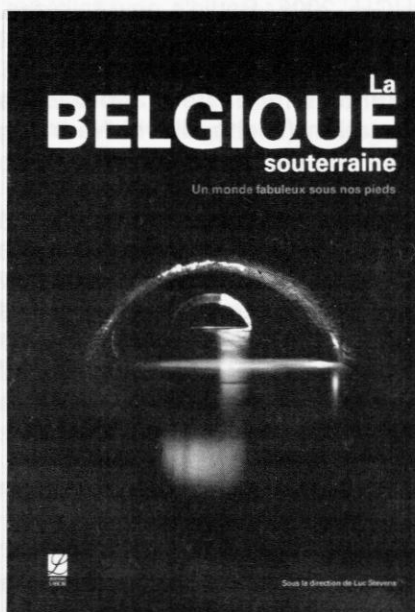
Source: ANON, 2006, Council digs in heels over Stonehenge tunnel. *New Civil Engineer*, 27 April 2006, page 11.

The Florence Penitentiary 'SuperMax' prison tunnel near Denver, Colorado

The Florence Penitentiary, 90 miles from Denver (Colorado), was built into a mountainside in 1994. It is the first of 'a new generation of high-security prisons' and is accessed only via a tunnel, according to a recent report in *The Guardian*. Almost all the 400 - 500 prisoners are kept in solitary confinement, in cells in which all the few items of furniture are built of concrete. The single small window in each cells gives a view only of the sky, so that inmates have the minimum possible number of clues as to their exact locations within the complex. There are very small exercise yards, with similarly restricted views, 1,400 remotely controlled doors, movement sensors, pressure pads, and gun towers.

Source: Ewen MacASKILL, 2006, SuperMax prison: no soft option in 'Alcatraz of the Rockies.' *The Guardian*, May 2006.

Books



La Belgique souterraine
 Edited by Luc Stevens
 Editions Labor
 2005
 ISBN 2-8040-2117-3
 35 Euros 252 pages

Belgium isn't a country that readily springs to most peoples' minds when thinking of underground space. However those who joined the Sub

Brit European trip in 2003 visited flint, coal, chalk and limestone mines along with tram tunnels and extensive fortifications under Namur Citadel. All these sites and many more are featured in this recently published and splendidly illustrated book.

The book (written in French) is subtitled 'A fabulous world beneath our feet' and is split into two roughly equal parts: the first deals with natural caves and the second with man-made space. The two parts are introduced by Claude Kahn and Luc Stevens, who are respectively Secretary and President of SFES, the French underground group, and good friends of Sub Brit. Luc undertook the overall editing and coordination of the book whilst other specialists have contributed geological and biological aspects.

The section on natural caves maps their location (almost all south of the River Meuse) and describes their formation and discovery over the years. The man-made section is broken down into mines, military, water and miscellaneous sites. There are only short references to 20th century military defences. Other sites covered briefly include ice wells, canal tunnels and a hermitage. Roughly half the space is used for photographs and plans which make the book accessible even to non French speakers.

The book concludes with an extensive bibliography and details of sites (quite a number) that are readily accessible to the public. To anyone whose underground interests are broad ranging and spread beyond these shores, this is a book I would heartily recommend.

A Martin Dixon

In Defense of Freedom; A History of RAF Greenham Common; The True Story Finally Told
 Illustrated, 172 pages, \$21.76.

After many years of in-depth research, interviews with personnel and from the submission of other very rare and unique material, the story of RAF

Greenham Common's controversial history can finally be told.

In Defense of Freedom tells the story of the history of this historic place from its ancient use by militias to its construction as an airfield in 1941 to its final demise at the conclusion of the Cold War in 1992.

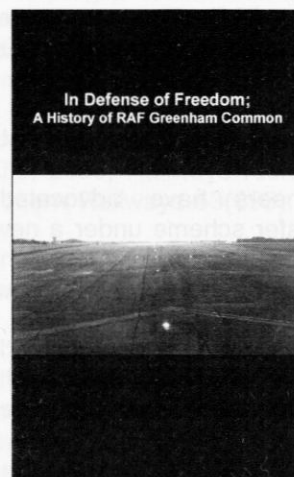
It is the story of how a small town in rural England became a modern fortress in the cause of freedom. This unique insight reveals how Greenham Common acted as a launch pad for the liberation of Western Europe in D-Day in 1944 with a stirring speech from General Eisenhower to its later Cold War development with the longest runway in Europe, the site of the British Land Speed Record and its final mission as base for the 501st Tactical Missile Wing's cruise missiles and protests in the 1980s.

In Defense of Freedom reveals the real story of Greenham Common and RAF Welford and their critical missions for the first time.

Link to Publication: <http://www.lulu.com/content/310488>

Jonathan Sayers is historian who grew up in the later years of the Cold War and saw its unfolding close to home. Jonathan holds a BA Hons in International Relations from the University of Sussex and a Masters in International Security Studies from the University of Reading and also studied at the Institut d'Etudes Politiques in Strasbourg, France. He currently works as a trade and investment researcher to a business intelligence firm working for the UK Trade & Investment division of the British Foreign Office. He lives in Thatcham, West Berkshire in the UK.

Jonathan Sayers



Books

Cleveland Mining Incidents Volume 3

Peter Tuffs

PB 96 Pages

£4.99

Death was an all to present danger in the Cleveland Mines. Volume 3 relates the circumstances and events leading up to the death of almost 600 men in and about the Cleveland mines. The miner was not the only class of workman to be killed in the practice of his ordinary everyday occupation, trappers, rolleymen, labourers, fillers and many other occupations fell victim to the ever present danger in the mines.

Lingdale Mine

Simon Chapman

PB 96 Pages

£6.95

Messrs Pease and Partners were relatively slow in realising the potential of Cleveland ironstone as a profitable enterprise. They often took over mines previously operated by other companies. At Lingdale they struck out on virgin territory. They sank a deep shaft mine at one of the highest points in the Cleveland ore field. Simon has been able to put together a fascinating picture of a mine which struggled all of its life but nevertheless made it to the last three mines to operate in Cleveland. A good read

about a mine which has had little published. Well illustrated with photographs, maps and diagrams. Packed with information, a good read.

Conglog Slate Quarry

Celia Hancock

Using original research by M.J.T. Lewis

A5, 36 pages,

£4.95

This book is a study of a quarry that is typical of many of the small scale and mostly unsuccessful ventures that comprised a quite large, and mostly overlooked, proportion of the North Wales slate industry. As such its story forms an integral part of the history of the industry. Covering the history and working of the site the book is illustrated with maps, photographs, colour throughout, and survey diagrams of the remains.

The Quarry can be found in the valley between its better known neighbours of Cwmorthin and Rhosydd and includes 19 colour photographs, 12 maps and diagrams all of which enhance a very useful and informative dialogue

These Books available from Moore Books :

<http://www.moorebooks.co.uk>

Mussolini's Bunker

Towards the end of WW2 Mussolini was confined under German house arrest at Villa Feltrinelli just north of Gargnano on Lake Garda in north eastern Italy. The large art deco villa is today a luxury private hotel right on the lake shore, but they have made use of the bunker that runs into the mountainside behind.

A gated entrance screens a 26 meter near horizontal tunnel - with dogleg - into the hillside. The steeply sloping surface is said by the owner to be 400 meters above its roof, although it looked less to me.

The bunker was constructed by a works unit of the SS, who were charged with guarding 'il Duce' during the puppet Republic of Salo period. In case of air attack he was to be protected in the bunker. In the event the villa was never assaulted and he was only taken in there for drills. On a day to day basis weapons and ammunition for the machine gun post on the villa roof was kept in it and bunks providing extra accommodation for the guards on special occasions like Hitler's visit (Gargnano is close to the German border).

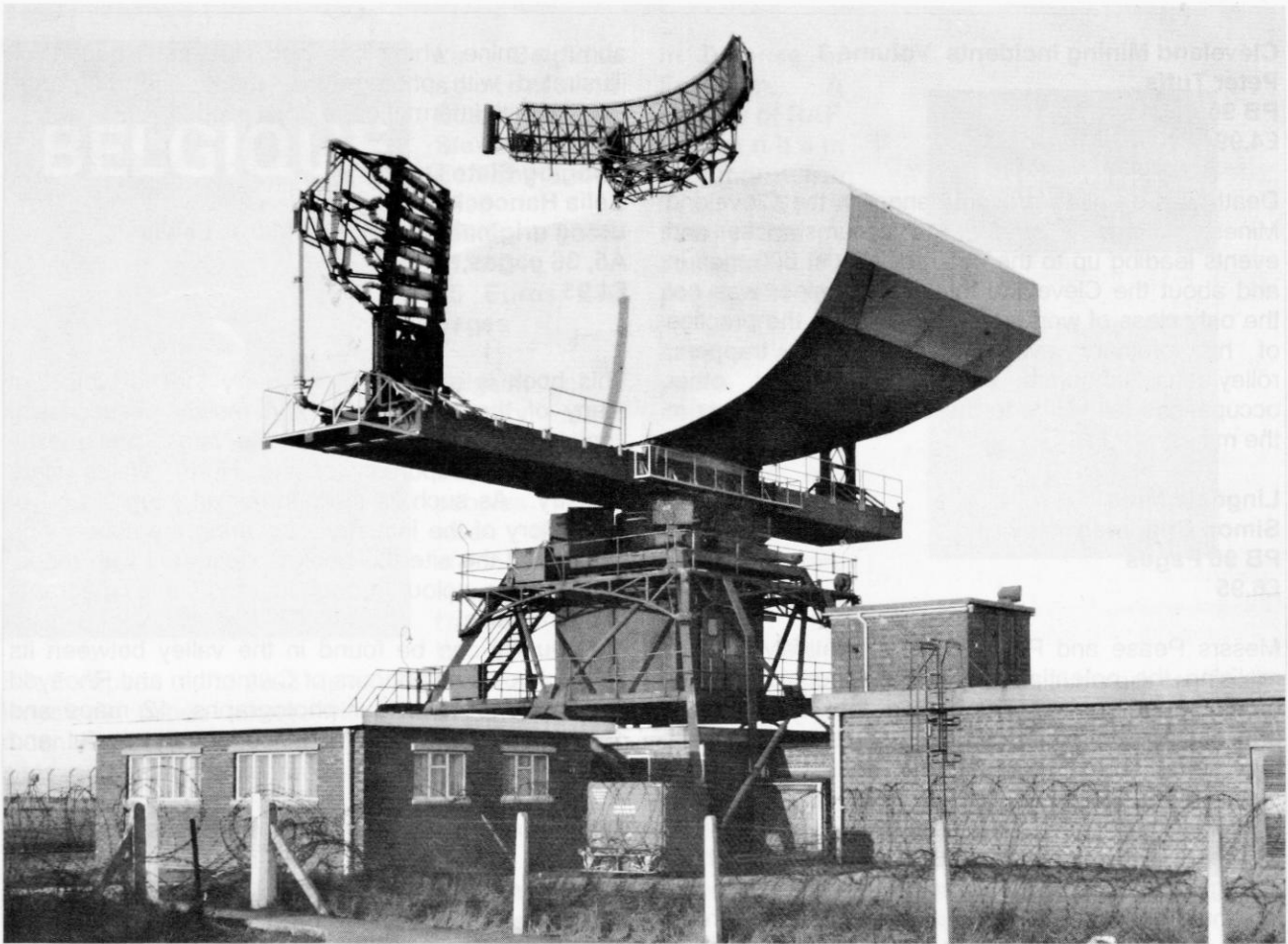
Today the rough rock surfaces have been cemented over and the bunker is well lit and dry. Most of the space is taken up with air conditioning units for the villa and a pumping system to increase water pressure.

There is not otherwise a lot to see. The hotel management are not welcoming of casual visitors.

Their website is: www.villafeltrinelli.com



RAF Staxton Wold



The Type 84 radar on its R17 modulator building

RAF Staxton Wold is the oldest operational radar site in the world. It was first established as one of the original batch of Radio Detection and Direction Finding (RDF) stations prior to WWII. After the war the site was used for several diverse purposes, ranging from a service driving school to a signals unit, with a brief reactivation as a radar site for a large exercise and as a Chain Home station during the first phase of the Rotor programme.

For some time the unit was left on care and maintenance basis, until the original aerials were dismantled in the late 1950's in preparation for the new generation of Linesman radars. The site became operational again, passing its radar picture to RAF Patrington, the Master Radar Station (MRS) in 1964. Ten years later it regained its status as a self-accounting unit with its own control facilities and has remained so since then. Its present role is as a Reporting Post within the UK Surveillance and Control System

History of RAF Staxton Wold

Preliminary UK trials of a practical system for radio detection of aircraft were carried out by Robert Watson Watt at Orfordness in Suffolk. Air Marshall

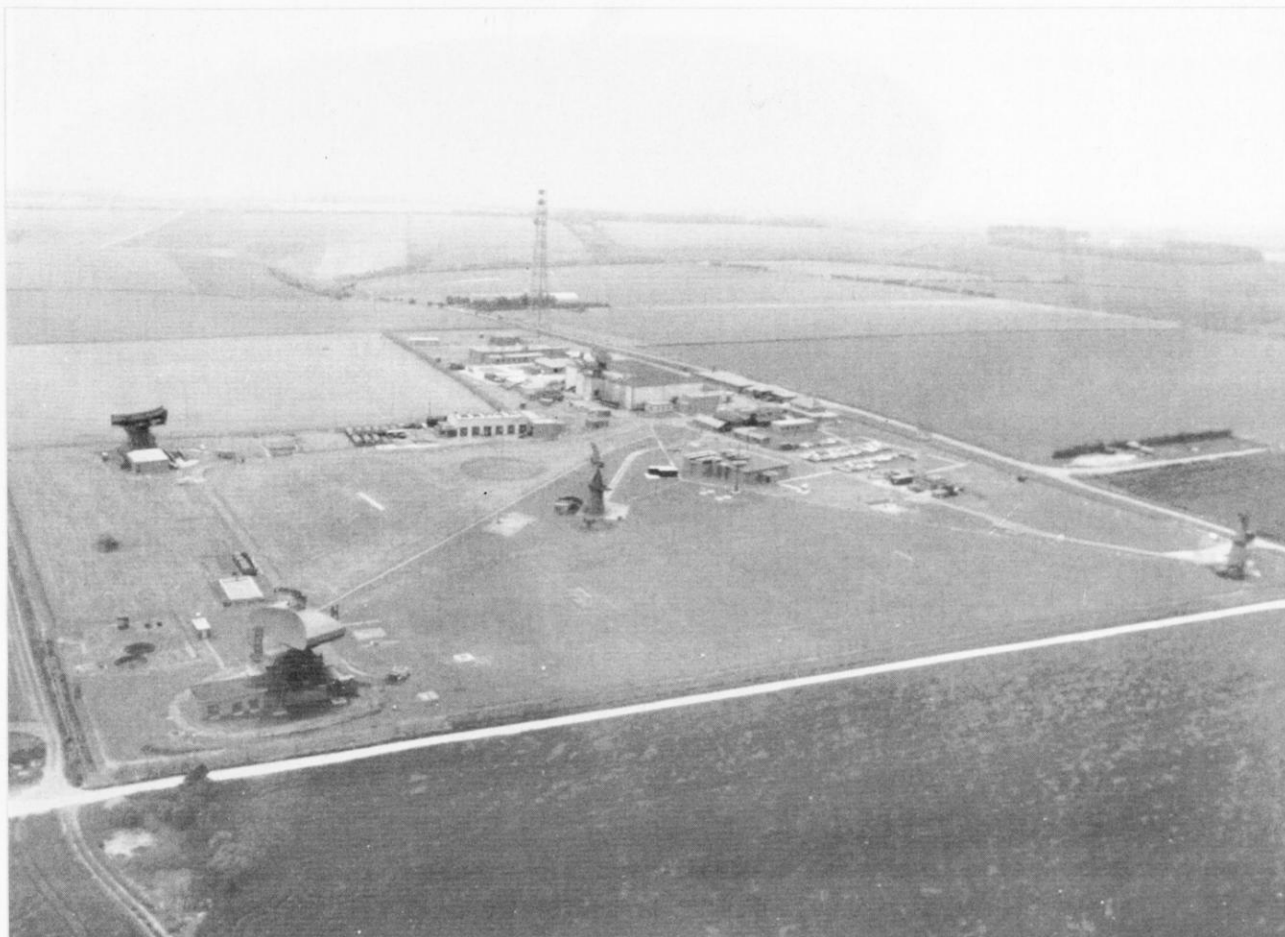
Sir Hugh Dowding (then Air Member for Research and Development) advised a demonstration of the system and this took place on 25th February 1935. As a result, the government decided to build a chain of RDF stations along the south and east coasts of England to detect the approach of hostile aircraft.

Research and development continued rapidly and plans were made for the first stations to be available for operations in 1936. The installation programme commenced with five stations covering the Thames estuary, but this was quickly expanded to 21 along the south and east coasts.

The Home Chain, as the stations became known collectively, expanded very quickly during the war and the individual Chain Home (CH) stations became familiar sights around the UK coastline. The chief value of the Chain Home at the outset of war was that it minimised the need for fighter aircraft and their pilots to carry out standing patrols. This conservation of scarce resources was particularly useful during the Battle of Britain in the summer of 1940.

One of the siting requirements for the Chain Home stations was that they should be on high ground near the coast. At nearly 600 feet above sea level and only four miles from the coast between Filey and Bridlington, Staxton Wold matched these

RAF Staxton Wold



Aerial view of RAF Staxton Wold in the late 1980's. The Type 84 radar is bottom left, High Speed Aerial centre left, HF200 height finders centre and bottom right, Reporting Post, right of centre HF200, R12 with Type 85 radar, above the reporting post, generator building to the left of the R12, microwave relay building and mast, top.

requirements well. During the course of the war, the absence of any higher ground landward of the site caused the occasional problem of saturating the equipment with responses from our own aircraft flying inland. This did not prevent very good performances at other times though and on 23rd August 1942, two hostile aircraft were sighted and shot down over Norfolk. The original station consisted of two sites, the 'A' site being the technical facility on top of Staxton Wold and the 'B' site being the domestic facility, one mile away at the bottom of a long steep hill at the foot of the Wold, adjacent to what is now the Staxton roundabout. This cause great problems during the winters of 1940/41 and 1941/42 when the full force of the Yorkshire winter meant that on several occasions it was impossible to travel between the two sites. On more than one occasion food had to be passed up the hill by human chain.

The Unit, Station 36 of the Chain Home was ready for operational use by 1st April 1939 under the control of the Air Officer Commanding-in-Chief, Fighter Command at Bentley Priory and was designated Air Ministry Experimental Station (AMES) Type 1 Chain Home (2 channels), Flood Lit Early Warning Station

with Height Finding. The station also had two adjacent buried reserves, underground chambers with a reserve transmitter and receiver that could be activated in the event of the main transmitter or receiver blocks being taken off line following an air attack.

The familiar CH pattern of four steel 360 foot transmitter and four wooden 240' receiver masts, with the attendant equipment and personnel were parented by RAF Church Fenton to begin with and maintained by No. 4 Radio Servicing Unit. (One of the transmitter masts was later removed, together with one from Great Bromley in Essex to be re-erected at Noss Hill in the Orkneys.) The latter unit evolved alongside the increasing number of radar units, including Ground Control Intercept (GCI) system to become No.73 Signals Wing on 6th February 1941, responsible to No 60 Group of Fighter Command for parenting of all the radar units in the north east of the country. No 73 Signals Wing increased in size during the war and eventually became Northern Signals Area with responsibility for all radar stations north of Cambridge, including all RAF personnel in Ireland.

RAF Staxton Wold



Open day at RAF Staxton Wold in the 1980's with HF200 height finder left and Type 84 right.

In strict operational terms, the station could not be described as particularly busy in meeting its design purpose of detecting hostile aircraft. There are no detailed records of the sightings of hostiles in the early part of the war, but during 1941 and early 1942, only 3 – 4 hostile sightings were made each month. After that time a marked falling off of enemy activity was recorded.

There were however other valuable tasks that Staxton Wold performed, the execution of which earned the Unit regular praise. Indeed, in November 1944 the Air Officer Commanding judged the Unit to be the best CH station that he had ever seen. Beside the very good range and height performance obtained by Staxton Wold, allied bombers were given the reassuring benefit of SOS tracks (signal beams that they could follow) to help them home. Ships that had strayed from their convoys could be given assistance to help them back on route. In early 1945 there was an increase in U-boat activity in the North Sea and Staxton Wold was able to demonstrate its low level cover by carrying out surface watching duties for U-boats that were transiting to the surface; this was a regular occurrence. In July 1943 the 73 Wing Defence School arrived to operate from Staxton Wold and from August 1944 the station hosted the Service Driving School.

Staxton Wold was fortunate in that it was never

attacked by enemy aircraft. However on 11th December 1942, a Halifax bomber was returning from an operation with its bomb load still aboard and the fuselage on fire when the load of incendiaries and a 1000lb bomb were jettisoned, landing in an adjacent field. No damage was caused to the station and the station personnel extinguished the fires.

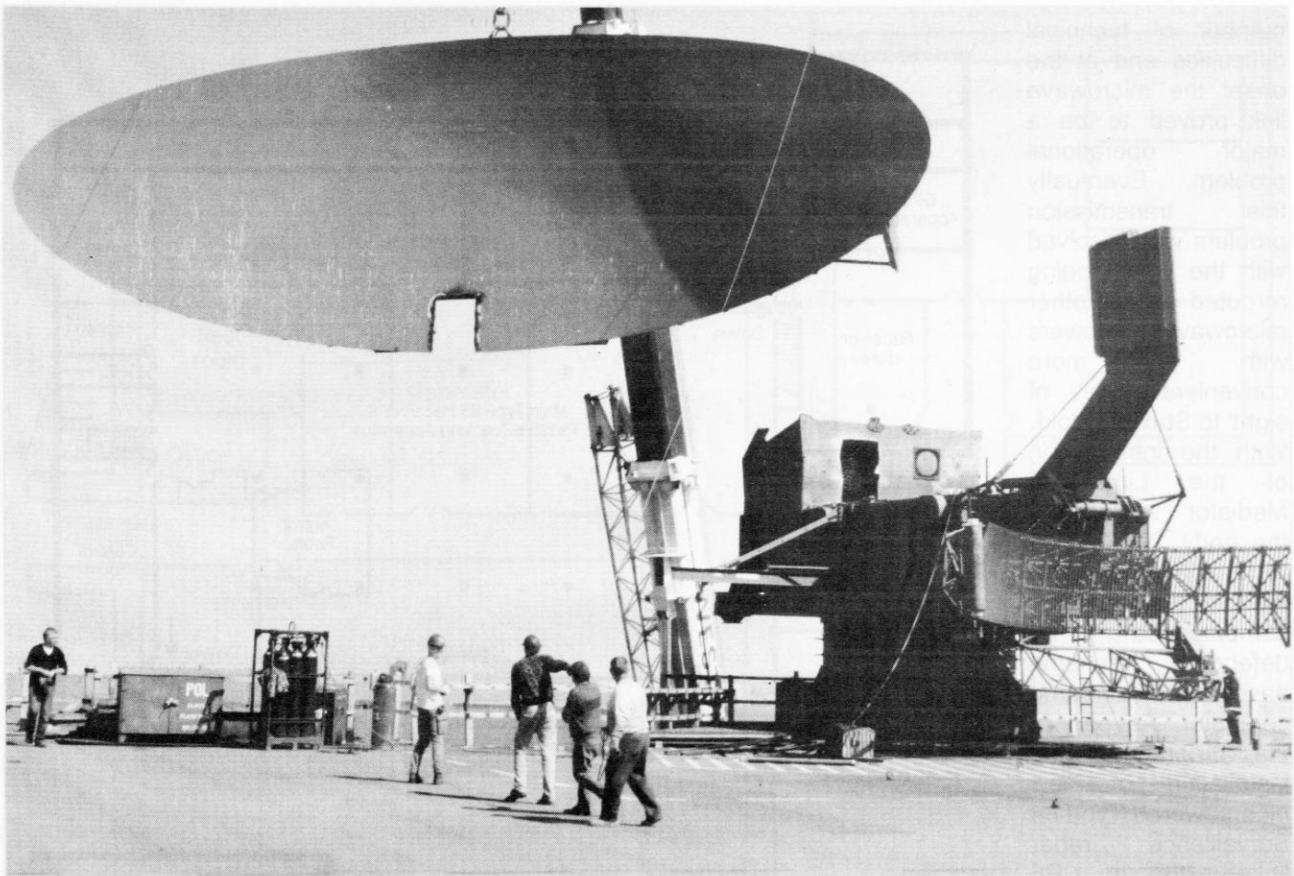
The Northern Signals Area took on parenting responsibility for 191 Signals Unit as Staxton Wold had become known when it was reduced to care and maintenance in October 1945. Over the next three years the site was cleared and the underground bunkers were bricked up.

Staxton Wold was retained as a CH station during the early stages (Phase 1 & 2) of the ROTOR 1 programme which was evolved in 1950 to re-establish an effective air defence radar network. It was given the rotor designation WSD

The existing equipment was modified and renovated to provide temporary cover during the construction of the new protected radar sites.

Following the full implementation of ROTOR Staxton Wold was taken off line on 31st January 1956 and placed in care and maintenance. During the early 1950's the site was parented by five different units. For one month RAF Henlow assumed responsibility, followed by RAF Grangemouth for six months before RAF Linton-on-Ouse took over. Linton-on-Ouse

RAF Staxton Wold



Dismantling the Type 85 radar in the early 1990's

developed the Unit up to establishment strength for 'Operation Pinnacle' during September and October 1951.

After this operation, RAF Thornaby parented Staxton Wold for three months before that arrangement was declared inadequate and Linton-on-Ouse again took over. Staxton Wold was then used for training of reservists and then advanced radio operator training until 1952.

999 Signals Unit was a mobile convoy formed in March 1953 to provide reserve cover for the range at Luce Bay near Stranraer. When not required the convoy was based at Staxton Wold and was administered by 191 Signals Unit under the operational command of 1 Group, Bomber Command. RAF Patrington assumed responsibility for Staxton Wold in April 1953 and thus began a link that was to last 30 years.

191 Signals Unit was eventually disbanded on 31st January 1956 when the station was no longer required as part of the Rotor programme and a care and maintenance party came into being. Then on 6th March 1956, 999 Signals Unit moved to RAF Ouston and the site was left under care and maintenance under the control of RAF Patrington.

In 1959 the old Chain Home masts were dismantled to make way for a new generation of Linesman Radars. These radars represented a great

improvement over previous radars, being more capable and more sophisticated.

Due to the threat of wide band noise jamming of ground radar by airborne Carcinotron jammers some form of countermeasures became essential. In March 1960 a new Passive Defence radar was established under the codename 'Project Winkle'; the PDR could determine the position of a large number of jammers simultaneously. In trials four aircraft were used with a Type 80 radar. A horn aerial and the bulk of the PDR equipment was at the trials site at Bard Hill in Norfolk with a beamed aerial at RAF Bampton, a former Rotor station.

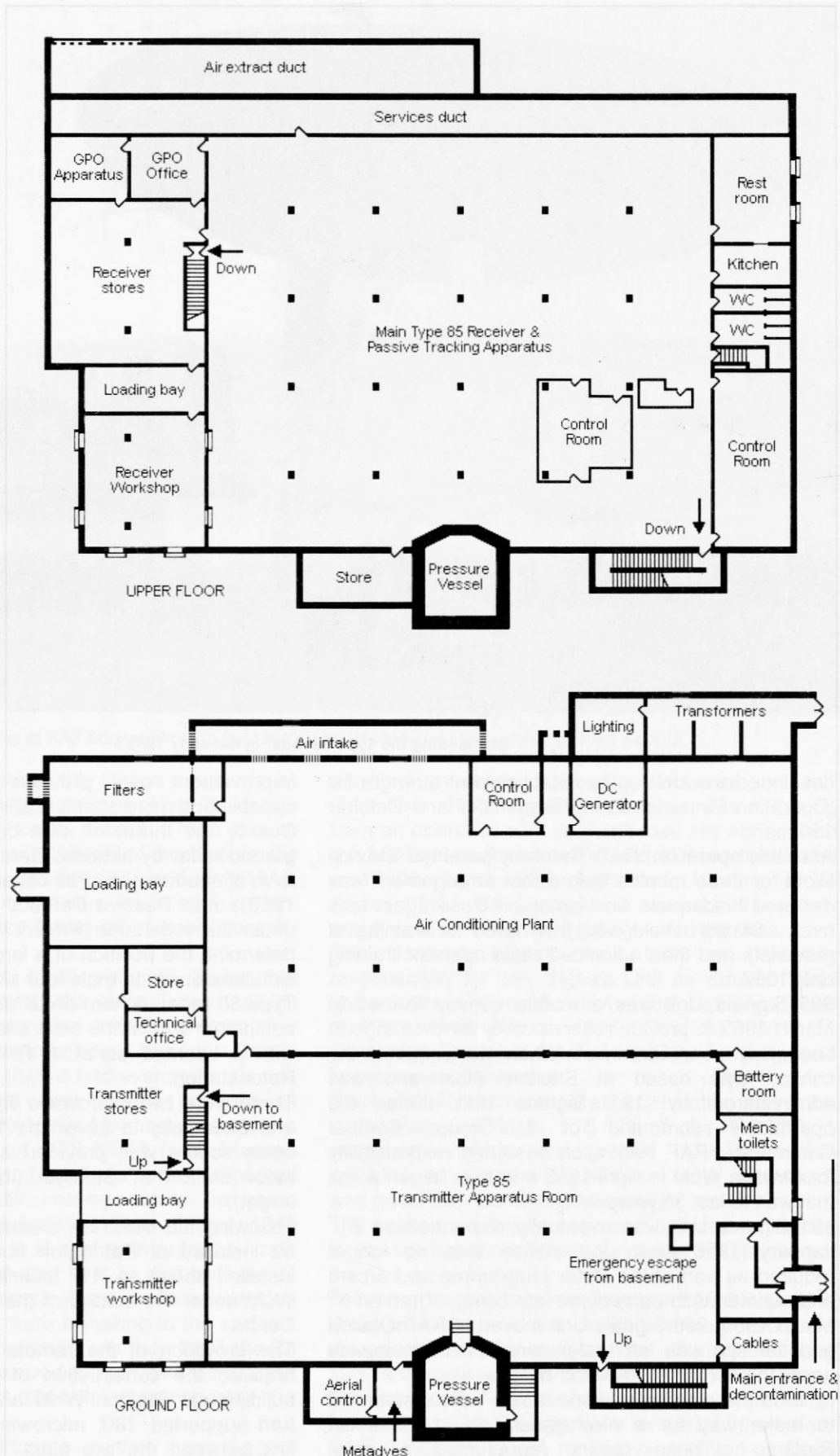
There were two microwave link relays to Patrington and Skendleby to cover the 100 mile hop. A static noise source was provided at the old chain home radar station at Stenigot (in effect as stationary target).

Following the trials the production PDR was due to be installed at Patrington but in the event it was installed above an R17 technical building at Staxton Wold under the control of the Patrington Operations Centre

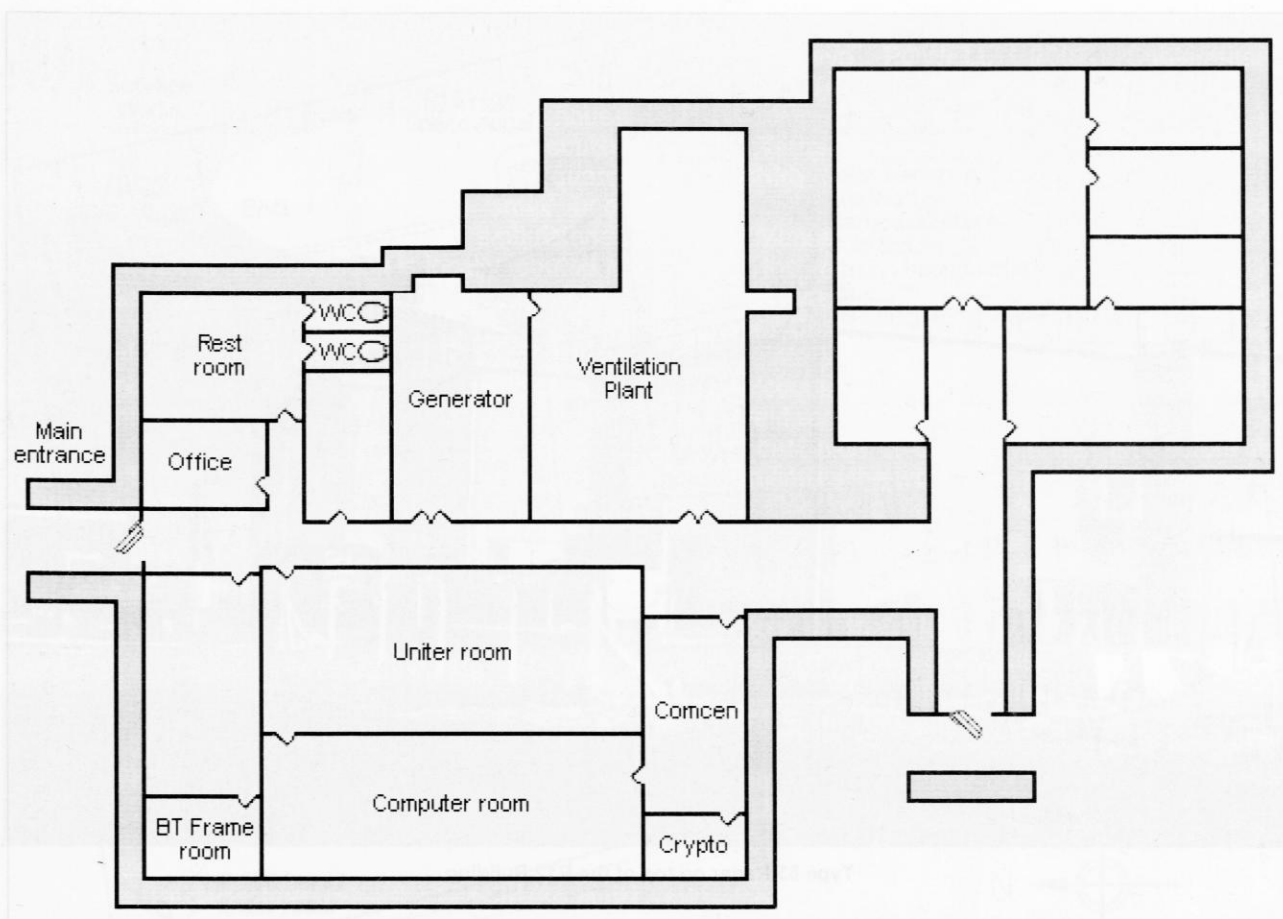
The provision of the remote site at Staxton Wold required the construction of new microwave relay buildings at Staxton Wold and Patrington which in turn supported 180' microwave towers providing a link between the two sites. This brought with it a

RAF Staxton Wold

number of technical difficulties and at the onset the microwave link proved to be a major operational problem. Eventually this transmission problem was resolved with the signal being rerouted via other microwave towers with a more convenient 'line of sight' to Staxton Wold. With the introduction of the Linesman/Mediator system in the early 1960's new technology brought the first fully computerised air defence scheme based on a mainframe computer. As part of the programme the installation of new high powered Type 84 Surveillance radar linked to an R6 technical block was proposed for Staxton Wold. This would increase the range of detection and would penetrate the latest Soviet jamming technology. A Type 85 radar mounted on an R14 technical block was later due to be built at Patrington with addition of a second Type 84 despite the close proximity to the Type 84 at Staxton Wold. However it was eventually decided to restrict major building projects to Boulmer, Neatishead and Staxton Wold with the installation of Type 84 and Type 85 radars at Staxton Wold with Patrington acting as the control centre with



RAF Staxton Wold



Left - Plan of the ground and upper floors of the R12 after the addition of the 'Wendy' Cabin

Above - Plan of the reporting post

the two level R3 bunker linked by microwave and landline to Staxton Wold, thereby obviating the need to build the R14 and R6 and saving money. Staxton Wold was, in any case, a more suitable location for the radars because of its high vantage point. When fully operational the station required 300 personnel. On 24th May 1964 the Type 84 radar was commissioned. The signals from that radar being passed to Patrington by radio link. After some initial problems, the MRS/ADRS link had worked well in spite of the 50 mile separation. The Type 84 was unable to establish height so two HF200 height finders were also added. The Type 85 was formally handed over on 24th January 1968. This radar was also able to cut through the Russian jamming with a range in excess of 200 miles; it was equipped with banks of transmitters and receivers which could rapidly change transmitting frequencies to deter hostile blocking attempts. In order to achieve this performance it required a set of five powerful diesel generators which would have been capable of supplying sufficient power for a large town. This radar was housed in a massive 3-storey R12 concrete technical block with a second block alongside

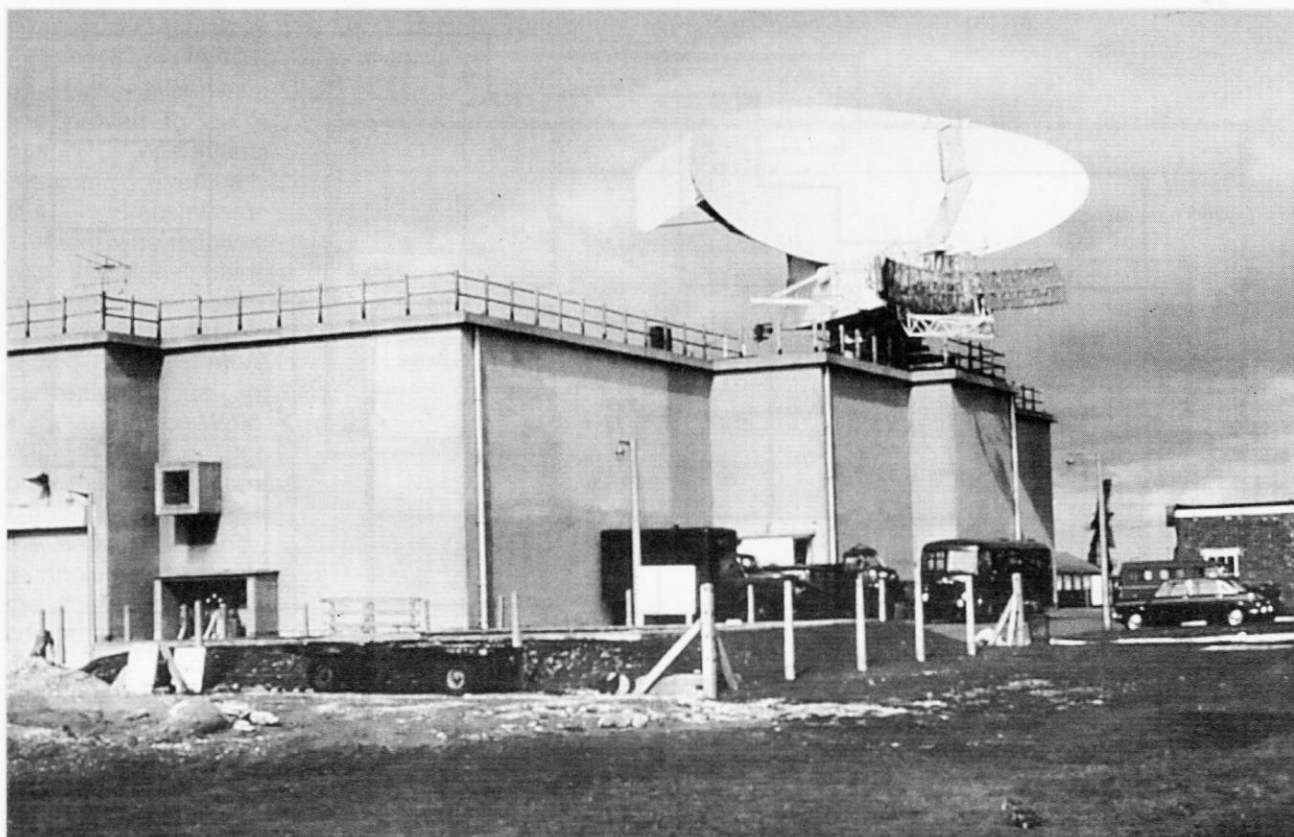
housing the generators. The R12 was one of three around the county, the others being at Neatishead and Boulmer.

When the linesman radars were installed, living-in personnel were accommodated at the domestic site of the already closed RAF Bampton at Flamborough Head. In 1967 RAF Leaconfield was used for single accommodation, transferring to Alamein Barracks (formerly RAF Driffield) when Leaconfield closed. Officers and SNCO's were moved into lodgings in the Scarborough or Driffield areas.

The unit was regarded as Engineering Wing, RAF Patrington until 31st March 1974 when Patrington closed, bringing about a reversal of roles as Staxton Wold took over parenting responsibility for Patrington. This responsibility finally ended on 31st October 1983 when the site was decommissioned.

When Patrington closed in 1974, Staxton Wold again became a self accounting unit (an RAF station that was autonomous subject to direction from a higher authority. Small units and stations, such as the smaller radar sites and Marine Craft Units [MCU] did not have the full facilities for accounting, pay, personnel, admin and medical care and were

RAF Staxton Wold



Type 85 Radar on top of the R12 Building

'parented' by the nearest major RAF station with these facilities. The parent however does not exercise technical or operational control) as a Control and Reporting Post under the tactical control of the Sector Operations Centre (SOC) at RAF Boulmer. Whereas previously the radar pictures had been transmitted to Patrington, in 1974/5 a full operations cabin was installed within the R12 at Staxton Wold so that Patrington's now absent capability was adequately replaced.

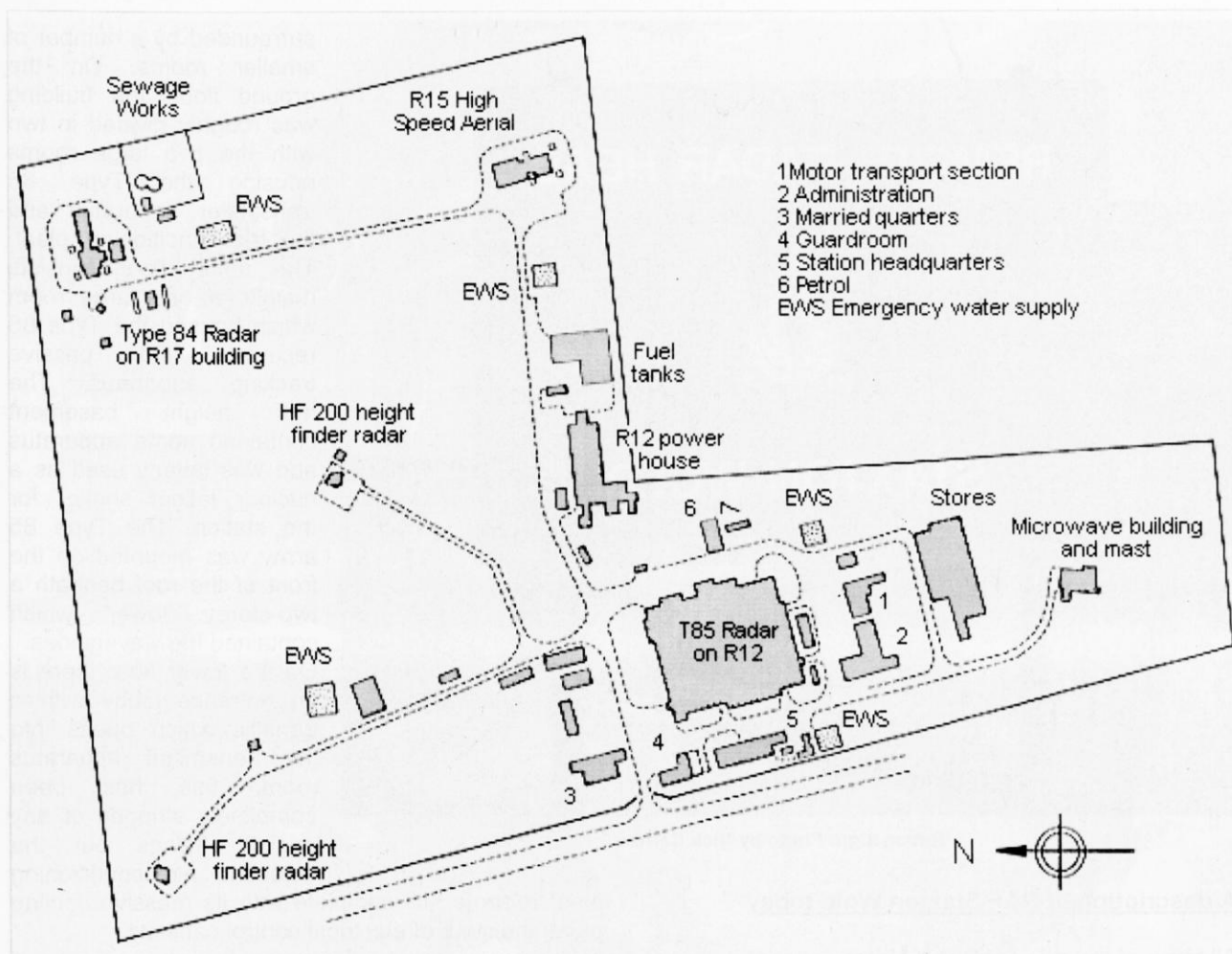
After April 1974, RAF Staxton Wold became an automated unit of 11 Group Strike Command HQ at Bentley Priory, the old Fighter Command HQ, re-establishing links first made in 1939. It controlled fighters as directed by the SOC at Boulmer, passing its radar picture to the Defence Data Centre in the L1 building at West Drayton which was the hub of air defence communications and Linesman. This then provided data to the Survive to Operate Centre (STOC) at High Wycombe. The radar picture was also sent to Eastern Radar at RAF Wattisham in Norfolk and Midland Radar at RAF North Luffenham both being joint military/civil facilities providing air traffic control services to coordinate civil and military traffic. Staxton Wold became a fully self accounting unit with parenting responsibility for RAF Cowden Range and partial parenting responsibility for a number of other units in the area.

By the 1980's Staxton Wold's sole function was as a

Control and Reporting Post and in 1989 the station was provided with a new single storey operations block for this function as part of UK Air Defence Ground Environment (UKADGE). A transmitter block was also built on farm land half a mile to the east of the station on the site of the WW2 buried reserves and a receiver block was built at Speeton on the site of the old rotor receiver block for RAF Bampton. By the end of the 1980's the Type 84 radar was redundant and was dismantled. The Type 85 was also decommissioned shortly afterwards. The radars were replaced by the smaller Type 90 series which, although smaller, utilised modern technology giving them a greater range while using considerably less power. Being small and mobile they could easily be hidden from attack and quickly moved to provide early warning wherever it was needed. The radar, its control cabin, generators and other essential equipment could be loaded onto seven trucks and be away within six hours.

With the end of the cold war and the reduced expectation of an air attack on the UK the radars were fixed in position beneath waterproof covers transparent to radio waves known as radomes with their control cabins in new brick buildings alongside. By 1995 the station had two operational radars, a Type 91 operated by 129 Signals Unit and a Type 93 operated by 146 Signals Unit, today only the Type 93 remains.

RAF Staxton Wold



Plan of RAF Staxton Wold in the 1970's before the Reporting Post was built.

RAF Staxton Wold is still operational as a Reporting Post with a remote radar head within the UK Surveillance and Control System (UK ASACS) which provides up to date information on air activity required to defend the UK and NATO. The UK ASACS is a highly sophisticated computer-based system which gathers and disseminates information on all aircraft flying in and around the UK Air Defence Region - this is known as the Recognized Air Picture (RAP). The information within the RAP is used by the Air Defence Commander when deciding whether to investigate or perhaps even destroy an aircraft flying in an area without permission. Information is fed into the RAP from the RAF's ground-based radars and from the air defence systems of our neighbouring NATO partners. However, the UK ASACS can also receive information via digital data-links from other ground, air or sea-based units including No 1 Air Control Centre, which as a part of the UK's Rapid Reaction Force holds a high state of readiness to deploy world-wide in support of crisis. The United Kingdom Air Operations Centre (UKAOC) is situated within Headquarters Strike Command at RAF High Wycombe.

The UK ASACS has 2 operational Control and Reporting Centres (CRC's) based at RAF Scampton in Lincolnshire and at RAF Boulmer in Northumberland. The CRC's receive and process information provided round-the-clock by military and civilian radars to produce the RAP. In addition to this radar data, the CRC's also exchange information using digital data-links with neighbouring NATO partners, AEW aircraft and ships. However, the production of the RAP is only one part of the CRC's duties, the second being the control of aircraft.

The CRC's are supported by three Reporting Posts (RP's) across the UK. In addition to those found at the CRC's, the locations of these RP's reflects the locations of the RAF's main Air Defence radars that feed information into the UK ASACS.

These Reporting Posts are located at: RAF Staxton Wold, RAF Benbecula in the Hebrides and RP Portreath which is a satellite of RAF St Mawgan on the north coast of Cornwall. A fourth Reporting Post at Saxa Vord closed in 2005 and a fifth at Bishopscourt in Northern Ireland closed in the late 1990's

RAF Staxton Wold



Station sign. Photo by Nick Catford

A description of RAF Staxton Wold today

All trace of the original Chain Home radar station was cleared away during the subsequent redevelopment of the site post war with the exception of the original pair of Air Ministry warden's houses which have been extended and incorporated into an administration block just inside the entrance gate. The two buried reserved were demolished when the new transmitter block was built in the late 1980's. A small underground bunker was found alongside a farm track close to the north west corner of the present compound. This was a Home Guard facility and has recently been sealed with concrete for health and safety reasons.

Several buildings from the Linesman/Mediator period still remain on the site. Both the R15 high speed aerial data handling building and the R17 modulator building for the Type 84 radar have been demolished but the massive R12 radar building for the Type 85 radar survives and is the best preserved of the three R12's built with much of its plant still intact. The other two R12's also survive, that at Boulmer has been completely stripped while the bunker at Neatishead still retains much of its air handling plant. The adjacent power house also survives with one generator still in use. The generator blocks at both Boulmer and Neatishead have been demolished. The three-storey building consists of three vast halls

surrounded by a number of smaller rooms. On the ground floor, the building was roughly divided in two with the two large rooms housing the Type 85 transmitter apparatus and the air conditioning plant. The upper floor consists mainly of one large room which housed the Type 85 receiver and passive tracking apparatus. The half height basement contained some apparatus and was latterly used as a nuclear fallout shelter for the station. The Type 85 array was mounted on the front of the roof beneath a two-storey 'tower' which contained the waveguides. On the lower floor there is an entrance lobby with a turnstile which opens into the transmitter apparatus room, this has been completely stripped of any original fittings but the adjacent air conditioning

plant room is still complete with its massive cooling plant and rows of electrical control cabinets.

The receiver hall on the upper floor has also been stripped of all its equipment. Following the closure of RAF Patrington new operations room was built within the receiver hall in 1974/5. This has always been unofficially usually referred to as the 'Wendy Cabin' and it still retains its five floor standing operators' positions and Perspex tote screens. At the far end of the receiver hall the GPO apparatus room is also still fully intact with its main distribution frame and several racks of repeaters. The kitchen on the upper floor retains some of its fittings with a serving hatch into the adjacent rest room/canteen. The two-storey loading bay still retains its power hoist.

Some plant was located in the low basement but it was also designated as an air raid shelter for the station with a protection factor of 1000. There is only one stairway down into the basement, adjacent to the plant hoist but there is also an emergency exit consisting of a ladder to a trapdoor in the floor of the transmitter apparatus room.

The building is without power or water and is surrounded by a low fence but there appears to be no immediate threat of demolition.

At the south end of the site, adjacent to the present communications mast is the new microwave relay building built to provide direct communitionians between Staxton Wold and Patrington. (The

RAF Staxton Wold



The control cabin built within the receiver hall on the upper floor of the R12. The 'Wendy Cabin', as it became know, was built in 1974/5 following the closure of RAF Patrington allowing Staxton Wold to take full operational control of its own radar picture. Photo by Nick Catford

reciprocal building at Patrington also still stands). The building is now unused and has been stripped of all fittings apart from some electrical switchgear. The adjacent radio mast is a new structure replacing the original 180' microwave tower.

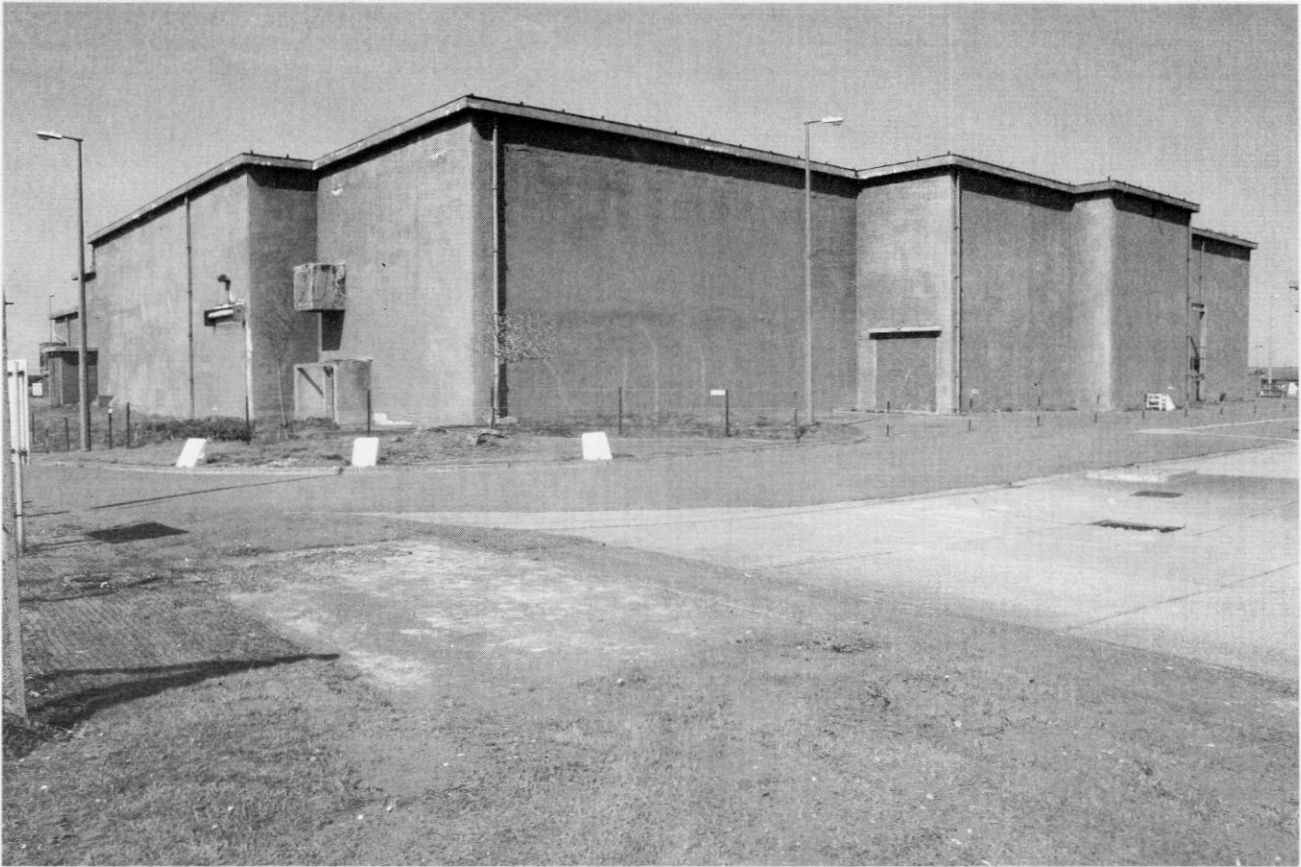
Other buildings still surviving from the Linesman era include stores, workshops, guardroom, fire station, motor transport section and a number of Norcon pillboxes. Newer buildings include a combined mess and two storey barrack block.

The Reporting Post is housed in a single storey bunker in the centre of the compound, close to the site of one of the earlier HF200 height finder radars. This is the hub of the current station although most of the original equipment has been stripped out and has been replaced by a single computer. The main entrance is through a steel blast door on the north side opening directly onto the main spine corridor.

On the left there is a short corridor leading to the guardroom/office and the crew rest room which includes a small kitchen. Beyond the corridor are the plant rooms including standby generator and ventilation plant. The operations rooms are on the right; these are BT Frammer room, Uniter room (now empty following the decommissioning of the Uniter system), computer room and Comcen. At the end of the spine corridor there is a second blast door to the right, this is for plant access and also acts as an emergency exit. The Type 93 radar beneath its Kevlar radome is a short distance to the south east of the Reporting Post.

Communications are facilitated by two VHF/UHF multi-channel radio transmitter and receiver blocks built at remote sites. The transmitter block is on farm land half a mile to the east of the station. Unusually the receiver site is much further away and has been

RAF Staxton Wold

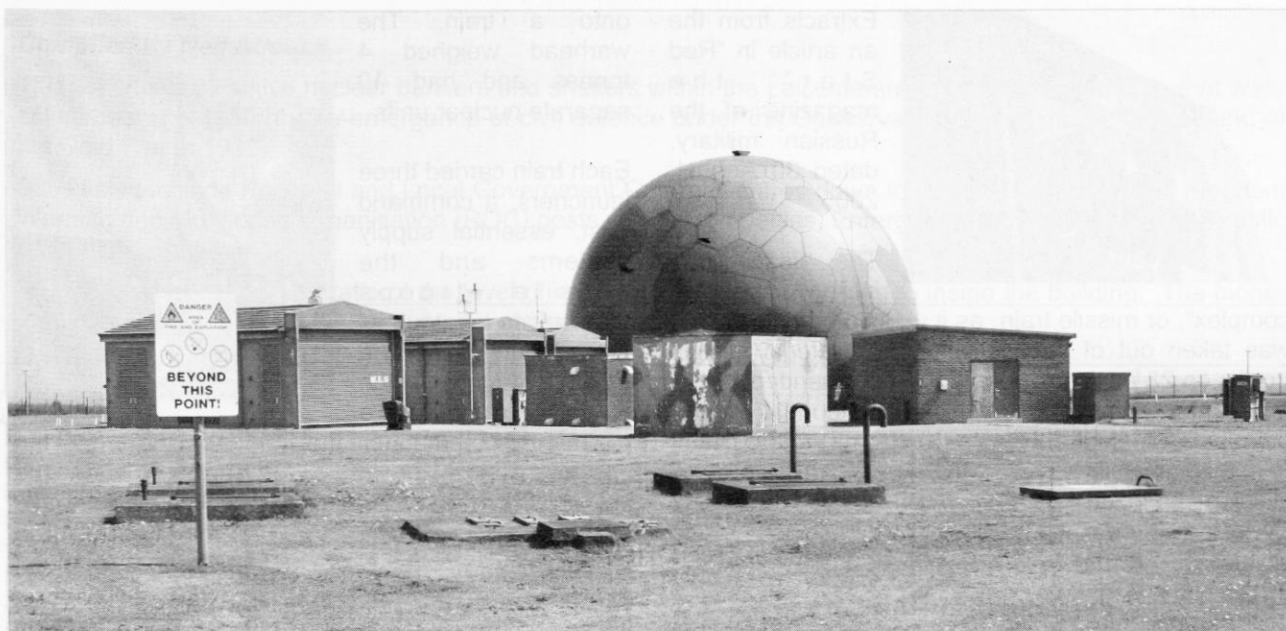


The R12 building that housed the transmitters and receivers to support the Type 85 radar. The radar was mounted on the roof at the front of the building. Photo by Nick Catford

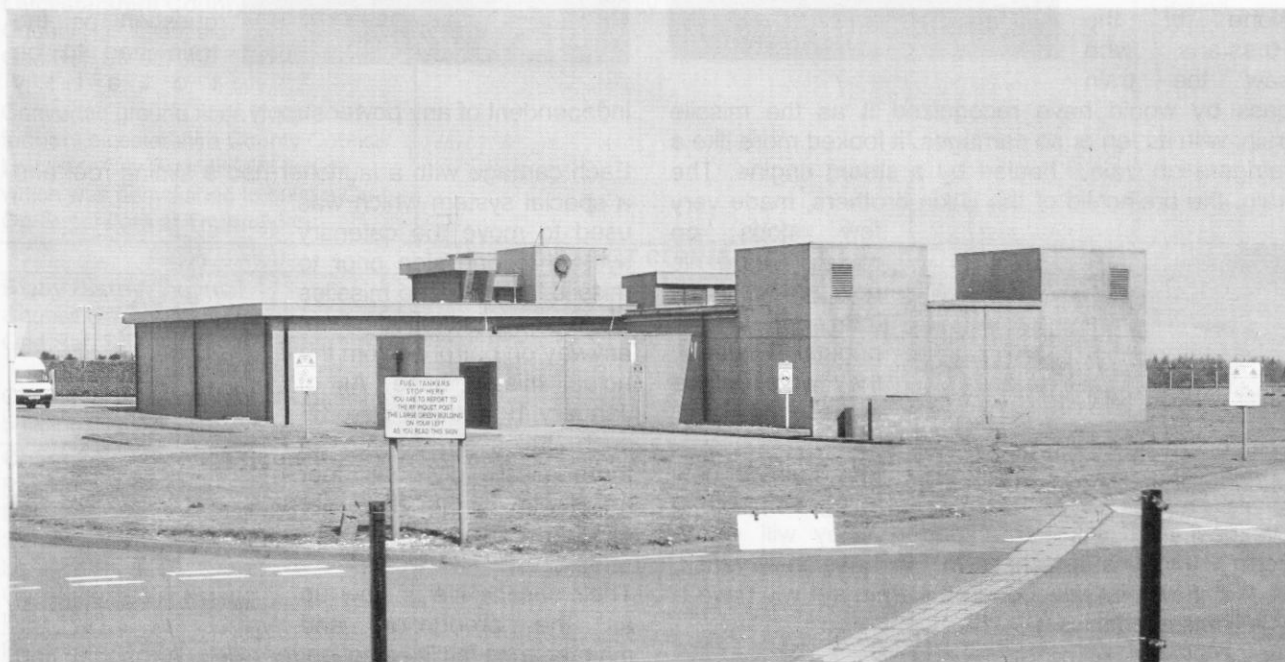


The only building remaining from the Chain Home days is the pair of Air Ministry wardens houses which have now been extended and are used for administration. Photo by Nick Catford

RAF Staxton Wold



The Type 93 radar and its control cabins. Photo by Nick Catford



The Reporting Post which was opened in 1969. Photo by Nick Catford

built on the old RAF Bampton receiver site. Both blocks are still in use and consist of two buildings. The larger 'L' shaped building houses the radio equipment and a standby generator. The smaller building was a guard room also including a small kitchen and four bunks.

From Nick Catford

Sources:

RAF Staxton Wold archive
PRO Files: Avia7/294 (1937 – 39), Operational report (1939-41) Avia7/485 & Air 25/681
Cold War Building for a Nuclear Confrontation 1946 – 1989 – Published by English Heritage 2003 ISBN 1 873592 69 8
Royal Air Force web site
Bob Jenner
Keith Ward

Missile Train



Extracts from the an article in "Red Star" the magazine of the Russian military, dated 30 August, 2005

The last "rail-borne combat complex", or missile train, as it was commonly called, was taken out of service with the strategic missile troops on 23 August, 2005. It was commanded by the regimental commander, Colonel Skidonenko, and travelled from central Russia (Kostroma) to the Urals, to the missile division base at Zvezdnyj in the vicinity of Perm', which will become its future home.



None of the Russians who saw the train

pass by would have recognized it as the missile train: with its ten or so carriages, it looked more like a refrigeration train, hauled by a steam engine. The train, the brainchild of the Utkin brothers, made very few stops on route. There is now not a single train left of the original twelve, they were unique in the world.



The train is now being stripped in Zvezdnyj, the missiles unloaded (they will go to Perm'), and the launchers to the base in Bryansk, while the normal coaches in the train set will have a new life in a logistics function.

The main passenger on the train was the Molodets missile, the SS-22 Scalpel, which was similar to the US MX missiles. The first regiment of missile trains commenced service trials in October 1987 near Kostroma. The SS-22 was a three-stage, solid-fuel ICBM, It had a maximum range of 10,000 km, with a lift-off weight of 104 tonnes - Imagine the headaches the designers had loading that

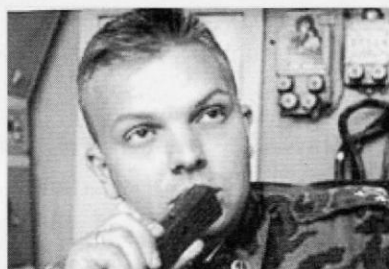


onto a train. The warhead weighed 4 tonnes and had 10 separate nuclear units.

Each train carried three launchers, a command post, essential supply systems and the missile troops themselves. A tour of active duty lasted a month, during which time only the regimental commander, the train inspectors and the

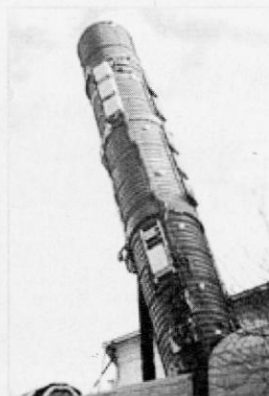


guard were allowed to leave the train. Three steam engines were involved in a tour, electric locomotives were out of the question as the train had to be totally



independent of any power supply.

Each carriage with a launcher had a sliding roof and a special system which was used to move the catenary system to one side prior to missile launch. The missiles could be launched from anyway on patrol or from the actual missile base. As of January 1998 there were 36 such trains in service at three missile divisions, four trains with 12 launchers per division.



Their service life is now up as the production and maintenance facilities no longer exist. Gorbachev had put an end to actual patrolling in a unilateral move in the early 1990's, and a missile train left its base for the last time in 1993. The article notes "But be assured: we are still protected, even though the missile train era is over. The missile complex based on the Topol', in both its silo and mobile variants, are still in the hands of the strategic missile troops"



Mike Barton

Wartime Locations in Leicestershire

Compiled by Neil Adcock

This list shows all active nuclear bunkers and shelters within the Leicestershire & Rutland boundary that were active between 1980 (the re-emergence of civil defence under the Conservative Government) and the end of the Cold War in 1992.

Sites listed include Regional and Local Government Control Centres down to Parish Council, United Kingdom Warning and Monitoring Organisation (ROC) posts, Utility Companies, Emergency communications and public and private shelters.

PF: Protective Factor. The ratio of the level of radiation outside the building to inside the building. The higher the Protective Factor, the higher the level of protection afforded by the building

Location	Purpose	Capacity (Approx)	Level
CENTRAL GOVERNMENT			
Sub Regional Headquarters Home Defence Region 3.2 Burder Street, Loughborough Grid Ref: SK 541205 Former WW2 cold store converted 1973 (demolished 1996)	Pre 1984: The administration of Leicestershire and Northamptonshire AFTER nuclear attack Post 1984: Standby to the Midlands Regional Government Headquarters at Skendleby in Lincolnshire AFTER nuclear attack	3.5 Acres 200 people	Below ground
COUNTY COUNCIL			
Leicestershire County Council County Hall, Glenfield Grid Ref: SK 557068 Converted ground floor. It replaced former Leicestershire County Council/ Leicester City Council joint facility which was demolished to build a Co- Op Superstore at Thurmaston	Leicestershire County Wartime Headquarters	50 people	Ground PF 600
DISTRICT COUNCILS			
Blaby District Council Council Offices, Narborough Grid Ref: SP 539977 Converted offices at rear of Council buildings.	Blaby District Wartime Headquarters	Unknown	Ground PF 500
Charnwood Borough Council <u>Pre 1991:</u> Basement of Council Offices, Southfields, Leicester Road, Loughborough Grid Ref: SK 537193 <u>Post 1991:</u> Basement of new office wing, Southfields, Leicester Road, Loughborough Grid Ref: SK 537193	Charnwood Borough Wartime Headquarters	Unknown	<u>Pre 1991:</u> Below Ground PF 450 <u>Post 1991:</u> Below Ground PF 800
Harborough District Council Adam & Eve Street, Market Harborough Grid Ref: SP 735874 Council Social Club	Harborough District Wartime Headquarters	Unknown	Ground PF 500
Hinckley & Bosworth Borough Council Argents Mead, St. Mary's Road, Hinckley Grid Ref: SP 426939 Converted basement floor offices	Hinckley & Bosworth Borough Wartime Headquarters and standby Leicestershire County Wartime Headquarters	Unknown	Below Ground PF 600

Wartime Locations in Leicestershire

<u>Location</u>	<u>Purpose</u>	<u>Capacity (Approx)</u>	<u>Level</u>
Leicester City Council Municipal Offices, Charles Street, Leicester Grid Ref: SK 589044 Purpose built basement dating from 1960's	Leicester City Wartime Headquarters	Unknown	Below Ground PF 700
Melton Borough Council <u>Pre 1987:</u> Basement of Egerton Lodge, Wilton Road, Melton Mowbray Grid Ref: SK 750192 <u>Post 1987:</u> Purpose built basement of new Council offices, Nottingham Road, Melton Mowbray Grid Ref: SK 747196	Melton Borough Wartime Headquarters	Unknown	<u>Pre 1987:</u> Below Ground PF 450 <u>Post 1987:</u> Below Ground PF 700
North West Leicestershire District Council Nuclear Free Zone (NFZ) Authority. Refused to comply with legislation requiring Local Authorities to have a 'Wartime Emergency Centre'. However, an internal office was nominated as a 'Control Centre' for the co-ordination of efforts to deal with peace time emergencies.			
Oadby & Wigston Borough Council Bushloe House, Station Road, Wigston Grid Ref: SP 602988 Converted basement to rear of Council offices	Oadby & Wigston Borough Wartime Headquarters	7 people	Below Ground PF 450
Rutland District Council Council Offices, Catmose, Oakham Grid Ref: SK 864085 Converted basement of Council Offices	Rutland District Wartime Headquarters	Unknown	Below Ground PF 600
PARISH COUNCILS			
Arnesby Parish Council Cellar of Sunnysdene, Mill Hill Road, Arnesby	Arnesby Parish Wartime Headquarters	Unknown	Below Ground
Barrow Upon Soar Parish Council Cellar of old people's home on Church Street, Barrow Upon Soar	Barrow Upon Soar Parish Wartime Headquarters	Unknown	Below Ground
Broughton & Dalby Parish Council Grimston Tunnel	Broughton & Dalby Parish Wartime Headquarters	Unknown	Unknown
Croft Parish Council Cellar of Heathcote Arms Public House	Croft Parish Wartime Headquarters	Unknown	Below Ground
Essendine Parish Council Cellar of Essendine Arms Public House	Essendine Parish Wartime Headquarters	Unknown	Below Ground
Gunthorpe Parish Meeting Cellar of Gunthorpe Hall	Gunthorpe Parish Wartime Headquarters	Unknown	Below Ground
Hallaton Parish Council Cellar of the Royal Oak Public House, High Street, Hallaton	Hallaton Parish Wartime Headquarters	Unknown	Below Ground
Hoton Parish Council Cellar of Hoton House	Hoton Parish Wartime Headquarters	Unknown	Below Ground
Huncote Parish Council Cellar of Red Lion Public House	Huncote Parish Wartime Headquarters	Unknown	Below Ground

Wartime Locations in Leicestershire

Location	Purpose	Capacity (Approx)	Level
Kegworth Parish Council Cellar of Refractory Mouldings in Kegworth Market Place (now demolished)	Kegworth Parish Wartime Headquarters	Unknown	Below Ground
Kibworth Beauchamp Parish Council Underground dance room of Fleckney Working Men's Club	Kibworth Beauchamp Parish Wartime Headquarters	Unknown	Below Ground
Kimcote & Walton Parish Council Cellar of Dog & Gun Public House, Walton	Kimcote & Walton Parish Wartime Headquarters	Unknown	Below Ground
Langham Parish Council Cellar of Ruddles Brewery	Langham Parish Wartime Headquarters	Unknown	Below Ground
Manton Parish Council Manton Rail Tunnel	Manton Parish Wartime Headquarters	747 yards long	Unknown
Oakthorpe and Donisthorpe Parish Council Local Pits were planned to be used	Oakthorpe and Donisthorpe Parish Wartime Headquarters	Unknown	Unknown
Osbaston Parish Council Local Farm belonging to Council Member	Osbaston Parish Wartime Headquarters	Unknown	Unknown
Rothley Parish Council Cellar of Mountsorrel Lane, Rothley	Rothley Parish Wartime Headquarters	Unknown	Below Ground
Somerby Parish Council Cellar of Stilton Cheese Public House, High Street, Somerby	Somerby Parish Wartime Headquarters	Unknown	Below Ground
South Luffenham Parish Council Cellar of Boot & Shoe Public House	South Luffenham Parish Wartime Headquarters	Unknown	Below Ground
Swithland Parish Meeting Cellar of Griffin Inn, Swithland	Swithland Parish Wartime Headquarters	Unknown	Below Ground
Thurlaston Parish Council Cellar of Dog & Gun Inn, Church Street, Thurlaston	Thurlaston Parish Wartime Headquarters	Unknown	Below Ground
Walton on the Wolds Parish Council Cellar of The Green, Walton	Walton on the Wolds Parish Wartime Headquarters	Unknown	Below Ground
UNITED KINGDOM WARNING AND MONITORING ORGANISATION			
Birstall ROC Post Grid Ref: SK 58961077	Member of Rearsby Cluster Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Buckminster ROC Post Grid Ref: SK 87102206	Member of Cluster whose master post resided outside of the County boundary Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Cold Overton ROC Post Grid Ref: SK 80620968	Master Post Linked to Bedford Group Control Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Fleckney ROC Post Grid Ref: SP 63739306	Member of Stoke Golding Cluster Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground

Wartime Locations in Leicestershire

Location	Purpose	Capacity (Approx)	Level
Harby ROC Post Grid Ref: SK 74553065	Member of Cluster whose master post resided outside of the County boundary Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Lutterworth ROC Post Grid Ref: SP 52038559	Member of Stoke Golding Cluster Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Rearsby ROC Post Grid Ref: SK 66411373	Master Post Linked to Coventry Group Control Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Shepshed ROC Post Grid Ref: SK 49492187	Member of Rearsby Cluster Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
Stoke Golding ROC Post Grid Ref: SP 39849667	Master Post Linked to Coventry Group Control Warning the public of imminent attack with nuclear weapons, plotting bomb bursts and monitoring fall-out	3 people	Below Ground
UTILITY COMPANIES			
British Gas De Montfort Street, Leicester Grid Ref: SK 583044 Converted basement of administrative offices (now demolished)	British Gas Leicestershire Wartime Headquarters	Unknown	Below Ground
Severn Trent Water Anstey Lane, Leicester Grid Ref: SK 575059 Purpose built facility completed in 1990	Severn Trent Water Leicestershire Wartime Headquarters	20 people	Semi Sunken
National Coal Board South Midlands Area Office, Coleorton Hall, Ashby-de-la-Zouch Grid Ref: SK 392173 Converted basement	National Coal Board Leicestershire Wartime Headquarters	Unknown	Below Ground
EMERGENCY COMMUNICATIONS			
British Broadcasting Corporation Islington Street, Freemans Common, Leicester Grid Ref: SK 588027 Purpose built facility dating from 1970s	Maintenance of transmitter for Wartime Broadcasting Service (WTBS)	2 or 3 people	Ground
British Telecom Cardinal Building, Humberstone Road, Leicester Grid Ref: SK 591047 Converted basement	The provision of the Emergency Manual Switching System (EMSS)	Unknown	Below Ground

Wartime Locations in Leicestershire

Location	Purpose	Capacity (Approx)	Level
British Telecom Wharf Street South, Leicester Grid Ref: SK 541049 Purpose built facility	Protection of all long distance connections and an electromechanical exchange	Unknown	Below Ground
British Telecom St. Georges Tower, St. Georges Way, Leicester Grid Ref: SK 593041 Basement room	Secure location for BT regional civil defence liaison office for the Midlands	Unknown	Below Ground
PRIVATELY OWNED SHELTERS			
Dr. Ron Lampard 190 London Road, Leicester Purpose built bunker (1982) under Doctors surgery costing £20,000. Has fallen into poor condition and is now below a Children's nursery	Protection of Dr. Ron Lampard and his immediate family.	5 people	Below Ground
Summerfields Estate, Ashby Road, Loughborough William Davis Ltd included the bunker under the garden of one of the properties it built on the then new housing estate.	Protection of occupants of property	12 feet by 8 feet 4 people	Below Ground
SHELTERS FOR THE GENERAL PUBLIC LISTED BY DISTRICT			
<u>Blaby</u>			
British Rail tunnel, Glenfield	Shelter for general public	1.25 miles long	Unknown
<u>Charnwood</u>			
St. Winifride's R.C. Primary School, Brittonia Street, Shepshed	Shelter for general public	15 people	Brick-above ground
Shelthorpe Primary School, Woodthorpe Road, Loughborough	Shelter for general public	87 people	Ground
736 Melton Road, Thurmaston	Shelter for general public	15 people	Brick-above ground
Southfields Park, Loughborough	Shelter for general public	87 people	Below Ground
C of E School, Queniborough	Shelter for general public	12 people	Brick-above ground
<u>Harborough</u>			
British Rail tunnel, Ovenden	Shelter for general public	462 yards long	Unknown
<u>Hinckley & Bosworth</u>			
C of E Infant School, Wood Street, Earl Shilton	Shelter for general public	12 people	Brick-above ground
C of E School, Grove Road, Burbage	Shelter for general public	50 people	Brick-above ground
College of F.E., London Road, Hinckley	Shelter for general public	12 people	Ground
<u>Leicester</u>			
Alderman Richard Hallam Junior & Infant School,	Shelter for general public	12 people	Brick-above ground
Bendbow Rise Infant School, Bendbow Rise	Shelter for general public	130 people	Semi Sunken

Wartime Locations in Leicestershire

Location	Purpose	Capacity (Approx)	Level
Blackbird Road Playing Fields	Shelter for general public	25 people	Brick-above ground
Braunstone Hall Junior School, Braunstone Park	Shelter for general public	250 people	Below Ground
Coleman Junior & Infant Schools, The Wayne Way	Shelter for general public	167 people	Semi Sunken
Fosse Infant School, Balfour Street	Shelter for general public	130 people	Below Ground
Inglehurst Infant School, Ingle Street	Shelter for general public	11 people	Semi Sunken
Inglehurst Junior School, Ingle Street	Shelter for general public	75 people	Semi Sunken
Knighton Fields Infant Annex, Aylestone Road	Shelter for general public	10 people	Semi Sunken
British Rail Tunnel, Knighton Fields Road	Shelter for general public	100 yards long	Unknown
Martin Street Playing Fields	Shelter for general public	25 people	Brick-above ground
Merrydale Junior School, Claydon Road	Shelter for general public	87 people	Brick-above ground
Rushey Mead Infant School, Gipsy Lane	Shelter for general public	150 people	Below Ground
Shaftesbury Junior School, Latimer Street	Shelter for general public	120 people	Semi Sunken
Slater Primary School, Slater Street	Shelter for general public	50 people	Brick-above ground
St. Barnabas Primary School, St. Barnabas Road	Shelter for general public	50 people	Brick-above ground
St. Mary's Fields Infant School, Heyworth Road	Shelter for general public	97 people	Semi Sunken
Western Park	Shelter for general public	67 people	Semi Sunken
Wyggeston Collegiate, Regent Road	Shelter for general public	290 people	Semi Sunken
Wyggeston & Queen Elizabeth I College, University Road	Shelter for general public	21 people	Semi Sunken
Wyvern Infant School, Wyvern Avenue	Shelter for general public	130 people	Semi Sunken
Melton			
Grove County Primary School, Asfordby Road, Melton	Shelter for general public	12 people	Brick-above ground
Playing Fields, Grantham Road	Shelter for general public	25 people	Below Ground
British Rail tunnel, Asfordby	Shelter for general public	419 yards long	Unknown
British Rail tunnel, Saxelby	Shelter for general public	543 yards long	Unknown
British Rail tunnel, Covered Way	Shelter for general public	100 yards long	Unknown
British Rail tunnel, Grimston	Shelter for general public	1,305 yards long	Unknown
Ashby Grammar School, Nottingham Road	Shelter for general public	87 people	Ground
Ashby C of E Infant School, North Street	Shelter for general public	25 people	Brick-above ground
Rutland			
British Rail tunnel, Manton	Shelter for general public	1.25 miles long	Unknown
British Rail tunnel, Wing	Shelter for general public	353 yards long	Unknown
British Rail tunnel, Glaston	Shelter for general public	1 mile long	Unknown
British Rail tunnel, Seaton	Shelter for general public	206 yards long	Unknown
British Rail tunnel, North Corby	Shelter for general public	1 mile long	Unknown

Underground Cappadocia



Not many, outside Turkey, have heard of it, and fewer yet can point to it on a map. Yet Cappadocia is the epicentre of underground interest in the near east. High on the central Anatolian plain, close to the country's geographic fulcrum is a landscape unlike any other on earth. Mysterious pillars of rock rise out of it, 'fairy chimneys' capped with basalt to resemble giant mushrooms. Others formations have been carved by wind, sand and rain into the shape of mythological beasts. Nearby stand cones hundreds of feet high. It has taken aeons to fashion these structures, and now something stranger yet is occurring.

"Nature, the greatest archaeologist of all, is doing our work for us, laying bare secrets kept for centuries," says Sâmi Yılmaz, a keen student of such phenomena who was born into this alien terrain. So alien, indeed, that George Lucas chose it as a location for the first Star Wars movie. Before us, commanding the little town of Goreme, a citadel of rock scrapes the cobalt sky. But erosion has revealed it to be hollow, its interior riddled with passages and chambers now starting to give up their secrets to Sâmi and the legion of historians and anthropologists

who have descended upon the region. Mystery pervades this wild country, unvisited even by most Turks. In caves and at ancient caravanserais on the old camel route from Persia Whirling Dervishes still perform the forbidden 'sema' ceremony. The accidental discovery of an underground city eight-storays deep at Kaymakli has led to the opening up of seven more, complete with churches, wells, wine presses and kitchens. Archaeologists now posit the existence of no fewer than two hundred secret cities as they puzzle over their history. Several of these it is now possible to visit, although, as the Footprint Guide dryly observes, not by those prone to claustrophobia.

Entrance to Kaymaki is through a cave, used until recently for storage. It was the partial collapse of one of its walls following heavier than usual rains that led to the discovery of a ramp down to an inner chamber. From this steps carved in the rock led downward into an extensive labyrinth of man-made caves, wells and air vents. An underground river just below the eighth, and lowest level, provided water to each floor, allowing to the inhabitants to take refuge from surface danger for perhaps two months. Granaries with millstones and bakers ovens suggest that such a

Underground Cappadocia



flare-ups in the general region to the Istanbul earthquake of 1999, Turkey's tourism has had to rebuild. It has done so on a narrow base, unduly reliant on the appeal of Bodrum and the beaches of the south, and the treasure house of Istanbul to the north west (itself a centre of tunnelling interest). With the future looking brighter Cappadocia's emergence as a third major centre promises much. Such also is the

retreat could have been extended even further if necessary - an eerie parallel to Cold War preparations.

Up to seven hundred people are thought to have been able to shelter in the largest subterranean city yet discovered, and artefacts found indicate that many of them continued their surface occupations underground. Evidence of this includes an elaborate wine-making plant, with wine presses, filtration and storage. Yet these are not just archaeological sites; five are open to visitors, with well-written guidebooks available in English, each edition of which expands to include the latest discoveries.

The emergence of such curiosities in a land of spare beauty has led to the opening of good hotels (offering remarkable value), and to the introduction of twice daily flights in by Turkish Airlines from London and European capitals via Istanbul. Hot air balloons and river rafts offer spectacular ways to explore the Cappadocian topography, as does the inauguration of an open air underground museum at Goreme following its declaration by UNESCO as a World Heritage Site. For Turkey the consequences could hardly be more critical.

"On average some calamity has befallen our country every three years since 1990," reflects Aydin Ayhan Guney of the local tourist agency, Argeus. "Each time visitor numbers have plummeted." From political

view of government which is investing trillions of Turkish lira on new highways through the province. Unspoken is the hope that such thoughtful development may assist Turkey's candidature for the European Union. It is certainly likely to deliver visitors curious about its subterranean mysteries to an area approached until recently only with difficulty.

In a cave high above Goreme an aged man falls to his knees before an icon believed to be unique: exquisitely executed in rich colours the fresco depicts Jesus as a haloed teenager. We are in an almost perfectly preserved Byzantine church of the 13th century, the walls, pillars, arches and ceiling of which are decorated with scenes from the life of Christ. It is one of thousands that survive in Turkey. What is unusual here is that the interior of Karanlik Kilise, the Dark Church, has been carved inside the soft 'tufa' rock of the hillside. The only natural light is that reflected from a small window into the vestibule, thereby conserving the frescos within.

Eight hundred years ago the chapel formed the heart of an underground monastic community whose size can be adduced from the refectory below: around table and benches sculpted out of the rock are seats for eighty monks. A giant cone a hundred yards away had been hollowed out to construct a convent for a smaller number of nuns. On this site alone are the remains of more such monasteries, their rock hewn churches still decorated with angels, evangelists and

Underground Cappadocia

saints, amongst them St George vanquishing a dragon of unreliable aspect. Today they are the subject of astonishment by archaeologist and casual visitor alike, and of veneration by pilgrims from the small Christian community remaining in Anatolia since the Greek-Turkish population exchanges of 1924.

Yunak Evleri, a handsome Ottoman mansion at nearby Urgup, was once the residence of a prosperous Turkish family of Greek Orthodox persuasion, later displaced. Now it has become a small hotel of oriental charm. The majority of the 27 guestrooms occupy restored stone village houses, each differing in architecture and character. But six of the bedrooms are in 7th century cave houses burrowed deep into the cliff that embraces the small market town. The experience of inhabiting one is surprisingly serene – and dry - although erosion and reconstruction have supplied windows and doors where originally there was a blank rock face with a concealed underground entrance. Now there are bathrooms with modern plumbing and sanitation, and even room service, (although it would be a pity to miss the view – and local menu - at the hotel's rooftop restaurant).

Enough of the surrounding Cliffside has eroded to reveal the pattern of troglodyte houses, from stables at the lowest level to living rooms above and at the highest level kitchens, from which smoke filtered up through the porous rock to escape invisibly from the hill top. Other cave hotels have opened, some with accommodation entirely underground, the majority offering economical room rates and services down to backpacker level. Meanwhile towns like Goreme support good restaurants opened by chefs returning from Istanbul. There are even nightclubs in caverns that once were the retreat of ancient peoples.

What, then, was the purpose of these subterranean dwellings? The answer, as Sami Yilmaz is not the first to suggest, lies in the soil. Volcanic eruptions thirty million years ago coated the land with ash, which over millennia compacted into the soft tufa rock. This the Hittites, who occupied the country in the third millennium BC, found easy to excavate into caves for storage at a constant cool temperature. As the Anatolian region was fought over by successive empires the inhabitants found it politic to disappear, digging out secret cities in which to survive for months at a time. By the 1st century AD early Christians were using them to hide from Roman persecution.

Some of the Cappadocian cave villages remained in occupation until recent times. Only in 1962 when a rock collapse revealed the interior of their houses to

onlookers did the inhabitants of Cavusin abandon their subterranean existence, and that on orders from government officials fearful of further disintegration. At the time of 'the great exposure' one comely villager is said to have been revealed in her tin bath. Today the settlement has a melancholy air, intensified by electricity poles and other signs of comparatively recent occupation. It is best dispelled by the purchase of a goat hair pashmina or traditional kelim from one of the ramshackle stalls erected at the approach by former inhabitants. Or a wander through the abandoned cave houses, the Moslem ones identified by flat ceilings, the Christian ones barrel-arched.

High above hot air balloons float across the Cappadocian plain, their pilots preparing to bump down in a mystical landscape of fairy chimneys and hidden cities, the majority of which remain lost beneath the surface. The possibility of stumbling upon the hidden entrance to one is sufficiently great for the authorities to promise formal recognition of the discoverer.

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UNDERGROUND FACTS

Original Travel (020 7978 7333 www.originaltravel.co.uk) offer packages on Turkish Airlines (0207 766 9300 www.turkishairlines.com) who fly twice daily from London to Kayseri via Istanbul from about £200 economy return inc tax.

Details of good value packages to Cappadocia with and without Istanbul stopovers are offered by a number of British tour companies listed by the Turkish Tourist office (0207 355 42 07 www.gototurkey.co.uk) This is a more reliable option than booking direct with Turkish agencies unlicensed in the UK.

Elixir Holidays 0207 722 2288 www.elixirholidays.com will also tailor packages for individuals and groups including UK flights, airport transfers and accommodation in cave hotels.

Argeus Tourist Agency (+90 384 341 4888 www.argeus.com.tr) provide reliable guides to underground sites and can arrange access to Whirling Dervish ceremony.

Kapadokya Balloons, Goreme (+90 384 271 2442 www.kapadokyaballoons.com)

WHEN TO GO

Mid May through June; September and October are sunny and warm. December and January are damn cold but beautiful in the snow.

Sweden 2006



Command bunker for the coastal defence photo by Steve Underwood

Dan McKenzie re-arranged the postponed 2004 Swedish trip for this year. Sixteen members flew out to Stockholm Skavsta on 7 June, including Mike Barton who travelled all the way from Germany to hear someone else say "Never Again!"

After arriving at the airport, which is ex-military and still has a cruciform runway, we were met by Lars Hansson, our local guide. He is extremely knowledgeable and a very friendly chap, I don't know



Femore fort photo by Steve Underwood

if he knew what he had let himself in for. We drove our Volvos to the hotel and then headed into nearby Nyköping to look at the old castle.

Up bright and early the next day, our first port of call was the old World War II gun sites on the ridge above Oxelosund, complete with a more modern radar tower. Just around the corner is an old command bunker for the coastal defence, which is built into a hillside under the local church. We attracted a lot of attention from locals here as one of our party committed the unforgivable sin of parking in "somebody's space"- apparently it is not just us Brits who have a thing about that- and then several locals turned out to stare in bewilderment at

these peculiar foreigners taking photographs of the sealed doors. As it is now used for internet services, the bunker was not accessible- this was to become all too familiar - but Lars was able to give us an excellent description.

Most of the afternoon was spent at Femore Fort, a superb Cold War fortress built in granite tunnels in the 1960s. For a full description see the excellent article by Tony Page in Subterranea 5 (September 2004). Everyone climbed up to the gun turret and had good fun ferreting about in the old unlit tunnels, not usually open to the public, and we were fed a very nice Swedish Army pea soup lunch with crispbreads and beer. We finished at Femore by going to the old WWII machine-gun position around the corner and the laser rangefinder tower, which was fascinating. It really is something to see so much equipment still in situ.

We made our way back to Nyköping by way of the local Civil Defence bunker, which is built into a grassy hillside on the perimeter of the town. Every town was required to

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have at least one facility like this, as Sweden took civil defence very seriously. Basement shelters are very common- our Ibis hotel had one, which was being used as a conference suite. Civil defence policy was integrated with national defence, and there were a number of voluntary organisations as well. As well as usual suspects like the Red Cross and women's organisations, this also included youth motorcycle clubs, who were able to take training courses in despatch deliveries for possible use as couriers in emergencies.

The Nykoping bunker was last operational in the 1990s and has been on care-and-maintenance since. The entrance tunnel is at street level but drops downwards. The rock walls of the tunnel have a spraycrete coating and a wide band of luminous paint leads down to the door. The main entrance has decontamination showers on both sides of the doors- there is a large airlock area on the other side and then the main door opens into a small cloakroom where the admissions officer has a desk, with control boards behind him.

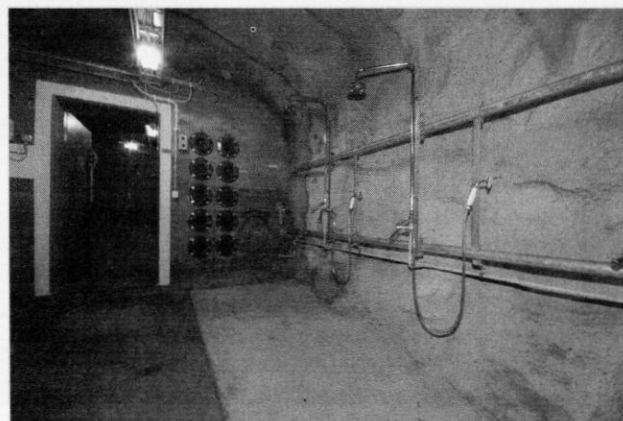
The bunker has two levels and consists of a blockhouse-type construction built inside an artificial cave in the hillside. There are small hatches in the outer wall of almost every room, from where it is possible to walk around the outside of the bunker between the building and the cave walls. There is also a steel ladder affording access to the upper level from outside and also to the roof.

This bunker is in spectacularly good condition. There is no trace of damp or water ingress either in the bunker itself or in the cave around, and all plant is in full working order. There are small dormitories with small sprung bunks similar to those we have seen in the former East Germany, and there is a bank of 90 small lockers at the foot of the stairs, apparently for the occupants' papers. The generators, which were started up for us, are housed outside the main bunker near the emergency exit. There are still telecommunications racks in situ, and the comms workers have their own separate room with a series of positions along one wall.

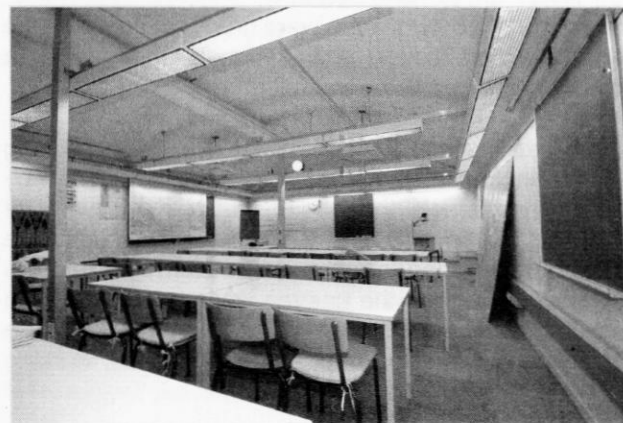
On the Friday we drove down to the ferry which would take us to the island of Siaro. This is located in the narrowest part of the Furundsleden, the biggest navigable course towards Finland- and Russia. It was conceived as part of a plan to fortify the area around Stockholm in 1910. The whole idea was that the crew manning the fort could see, but not be seen, and so instead of a traditional bastion-like fortress it was to be blasted into the rock. Construction of the fort commenced during the First World War in 1916, with work halting in 1918. In 1921 building recommenced,



Nykoping Civil Defence bunker - Entrance



Nykoping Civil Defence bunker - Decontamination



Nykoping Civil Defence bunker - Situation Room

with a mine station being ready in 1922 and two 15cm guns installed and it was completed in 1924, being manned two years later. In 1928 two track-bound 57mm guns were installed in the northern outworks of the fort, with two more stationary 57mm guns on the south-eastern part of the island.

The fort had two searchlights, one of which was 90cm diameter and the second 150cm. This was winched up into its operating position from below, but during the first exercises there was a serious

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Entrance to Siaro Fort - Photo Dan McKenzie

accident when two men were trapped beneath the armour-plated cover and seriously injured as a counterbalance had been omitted.

All the drilling was done manually, the drill-bits being tapped in with a sledgehammer and then rotated by hand, the tunnels then being blasted by dynamite inserted in the holes. The walls are painted white above yellow, and in order to produce as straight a line as possible on the uneven walls, a carbide lamp was hung up and a plank placed in front of it. The painters used the line of shadow as a guide, working with curve-handled paintbrushes.

Unlike at Femore Fort, the rock here is bad and most of the fort is damp, with some being absolutely wet. The damp was a problem for the fort right from the start, and in 1930 the Parliamentary Commissioner for Military Affairs condemned the fort, stating that, "The premises in the fort are deleterious. Quartering not allowed even for a brief period."

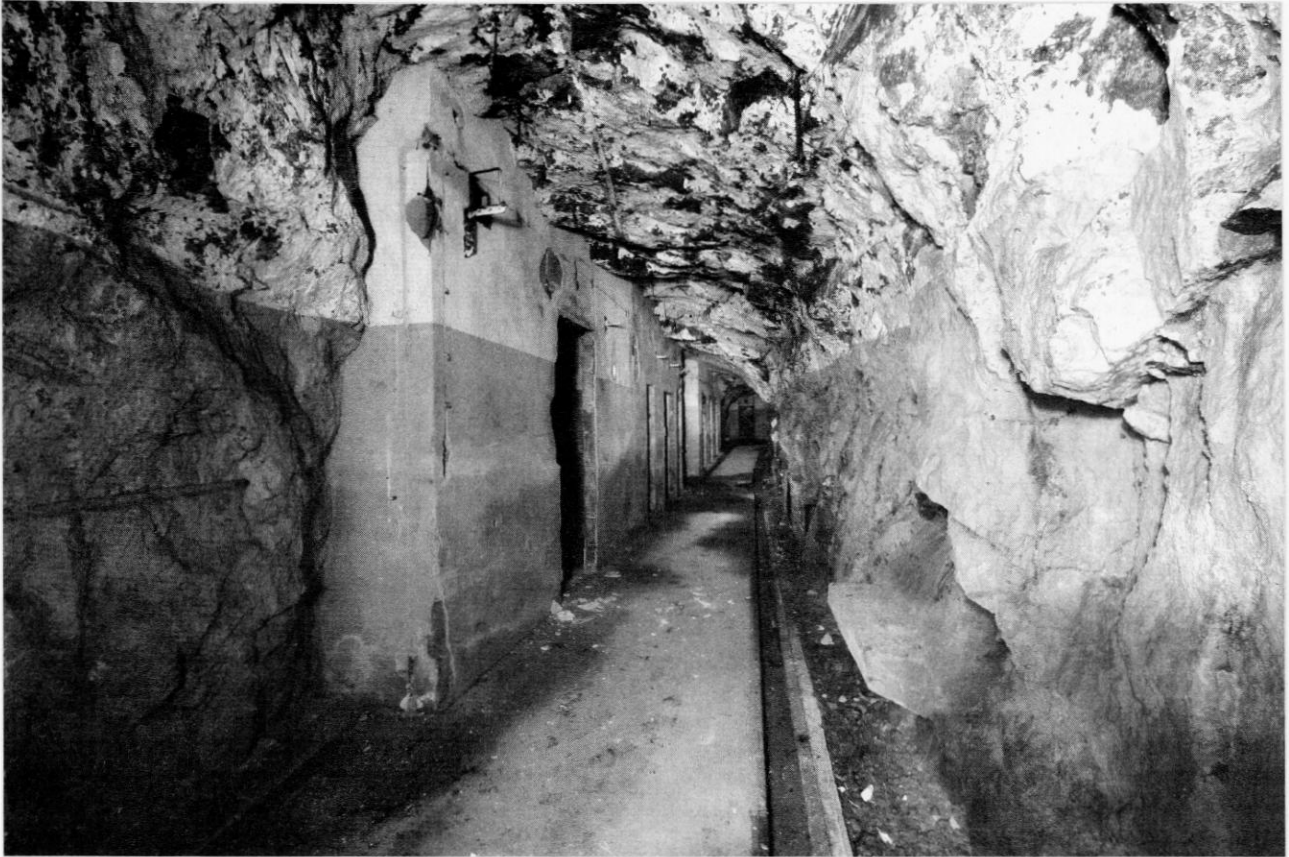
The fort was opened to the public as a museum in 1996. The engine room still has its generators, although they are rusty and unserviceable. The fort is roughly arranged in a spine pattern, with a long central tunnel. The large kitchen area takes up the

entire tunnel width. One room has been turned into a cinema and there are small exhibitions in the accommodation quarters. One of the searchlights is on display below its operating position.

The original barrack hut has been rebuilt and converted into a youth hostel, and we had another very enjoyable Swedish lunch there before catching the return ferry.

Next we headed for the Myttinge area, and stopped at a number of fortifications en route to the youth hostel. The first was one of a series of bastions known as the "Oscar" forts. These have distinctive moats around them, usually with a gatehouse nearby, and gun positions on the top. Most of these cupolas have now been capped over with thin concrete skins, some of which have fallen inwards and been resealed, others have trees growing through the caps. They are mostly sealed, as this one apparently was, but we climbed up to the top to see if there was any way in- and our persistence paid off. We found a small square hole in one of the collapsed cupolas, and local explorers had fashioned a ladder down to the staircase. One by one we entered the fort for a look around.

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Corridor in Stripped Fort - Photo Robin Ware

The fort has suffered with water ingress, with some areas quite wet and some thick calcite formations in places. There was some ventilation plant still in situ and an old heater in one of the rooms. The tunnels soon rebounded with camera flashes and calls for somebody called Noel Lights. The fort has several largish rooms and a way through to an upper level. It was good fun to poke about in and we eventually had to be reminded that time was ticking on!

We stopped at a second Oscar fort, which had been open on Lars's reconnaissance visit the previous week, but had since been securely locked and we could not get in. Apparently the unwelcome twin spectres of health and safety and liability fears are rearing their ugly heads in Sweden too, and sites are being lost rapidly. After this we drove to a little collection of redoubts on the coast- again, not accessible- before heading to the youth hostel. We took over a small waterfront café for dinner that evening and enjoyed a very pleasant Swedish meal. The poor couple running it had their work cut out, but a room full of hungry Brits probably tripled their takings and they were very obliging.

First stop the next day was at another of the "Oscar" forts, but one with a difference. Around the outside are ramparts with a firing step, and there is a short

rock tunnel behind it. This was used in the 1960s for storing low-level nuclear waste (this is a very low hazard- for perspective, coffee or a bag of nice Brazil nuts can contain the equivalent level of radiation). A concrete block was cast in a recess to one side with a series of cells set into it. Drums of the waste were lowered into these cells, which were then capped. The drums have long since been removed, and we took the opportunity for probably the most unusual group photo ever, since there was enough room for everybody to stand in their very own radioactive waste cell! After this, we climbed onto the top of the fort with the now-familiar capped cupolas and hunted for a way in, but once again this fort was sealed.

The next fort had a different design, with at least three large gun positions. This was open, and it was obvious from the only-just-spent light sticks inside that explorers come here frequently. At first the only apparent way in was through a flooded chamber. We managed to climb into the hatch from above and set up some brick steps for those too short to follow; other people went around the fort and found a dry way in. The drivers had asked for this to be a last resort because the Volvos have to be returned clean, so once the dry way was found the word was passed back quickly. Like Siaro, the rock here is bad and there is a considerable amount of water ingress,

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Stockholm Civil Defence Shelter - Blast doors. Photo Dan McKenzie

which in turn has grown some amazing formations in places which are worthy of many a show cave. This fort, roughly on a grid pattern, is quite extensive. All the rooms had been stripped out, apart from one large tank near to one of the other entrances. Little walled rooms had been built inside, a lot like at Siaro, and one single room was completely lined with metal. Again, this was a lot of fun to explore but we then had to press on, as we had a ferry to catch in the evening, several hours' drive away. First there was a little detour in Stockholm...

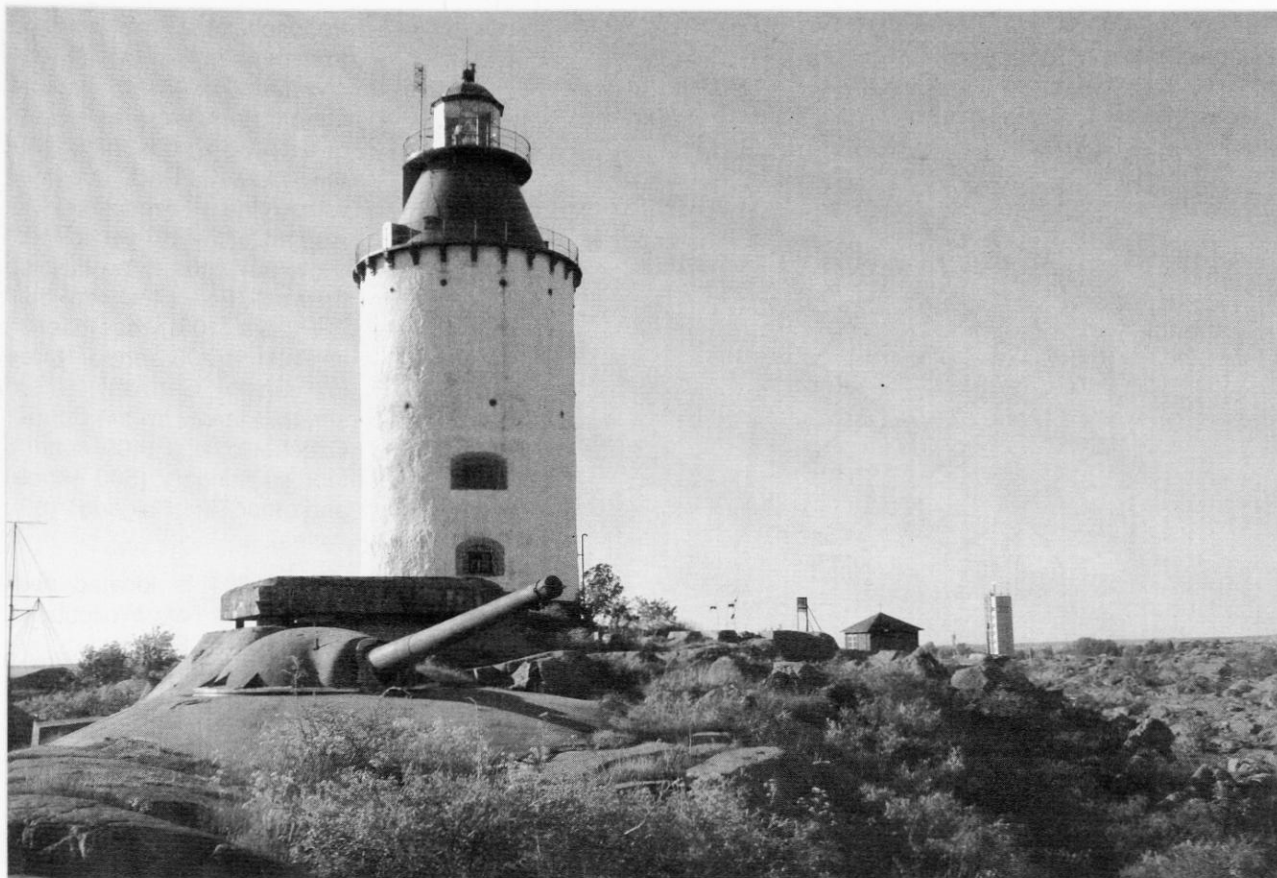
In Stockholm we parked up in an underground car park which was unusual in two respects. Initially, it had a petrol station in its entrance, but the tell-tale Civil Defence logo at the front of one of the parking bays was a clue that all was not what it seemed. There were originally at least fifteen large public shelters in Stockholm, and this is one of them. Built in the early 1950s, this is a dual-purpose building: it is a car park, but is equipped with plant and blast protection and is designed to be used as a mass shelter in extremis.

It is constructed in the side of a rock face where there is a cut for the main road, and has two large street-facing entrances. Inside is a small petrol station and

a pay barrier to enter the car park proper. The car park itself is a long tunnel divided into three levels, and at each end there are large blast doors which can be slid along on chains to seal the main car park at both ends. Beside these are smaller blast doors for personnel. There is ventilation plant in the ceiling, and at intervals down the main floor are small service hatches. At one of the ramps there is a diagram showing the size of the building and stating that it has room for 20,000 people – minus their Volvos. There are similar large-scale shelters incorporated into U-Bahn stations in Berlin; as always, they would be equipped during the period of tension. I have no idea what the passing Swedes thought of these Britons jumping around taking photographs in delight in a very hot, stuffy car park, they must have thought we were complete lunatics!

We had a long drive down to the ferry to the island of Landsort, where we were treated to moose rissoles – which are very nice – and then people went walking around the island, or gravitated to the bar to watch the Swedish football match with the locals. This party was somewhat bleary eyed at the start of the last day, which was walking most of the island and looking at various gun positions and radar plinths – the latter being T-shaped and laid flat along the ground,

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Lighthouse, Gun Battery and Command centre on the Island of Landsort - Photo Steve Underwood



Sub Brit Members on Landsort - Photo Mark Bennett

Nonetheless, it was a very interesting surface walk in beautiful sunshine, and we had fun on the boat ride back picking out the rocks that we now knew were not rocks at all, but camouflage cover for various pieces of equipment.

Lars Hansson and Dan McKenzie did a superb job in organising a very successful trip, which everyone really enjoyed and had a wonderful variety of different sites. Thanks also to

and could be raised in less than a minute. We had been unable to obtain permission to enter some of the disused bunkers, which was a shame.

Richard Challis, Bob Clary and Robin Ware, who drove the hire cars and endured the ritual taunts of "Your lights are on."

Jane MacGregor

Wollenberg Objekt-Nummer:301



The Reconstructed Tropo Tower at Wollenberg - Photo Dan McKenzie

The transmitter site at Wollenberg was one of three reinforced underground transmitter sites built in the former East Germany to provide a resilient and far reaching tropospheric radio transmission and receiving service for the Warsaw Pact forces (see footnote). It is the central of three sites with one site (now deliberately flooded) in the North - site 302 at Bad Sülze, and one site (also flooded) in the South - site 303 at Röhrsdorf, near Dresden. Together, these three sites formed the western most section of the

tropospheric scatter transmission network – codenamed BARS (Snow Leopard) - which was located at twenty-six sites throughout the Warsaw Pact countries with the exception of Romania, who would not allow any sites to be built on their soil. Five sites were built in Russia (100 series), seven in Poland (200 series), three in East Germany (300 series), three in the former Czechoslovakia (400 series), four in Hungary (500 series) and four in Bulgaria (600 series).

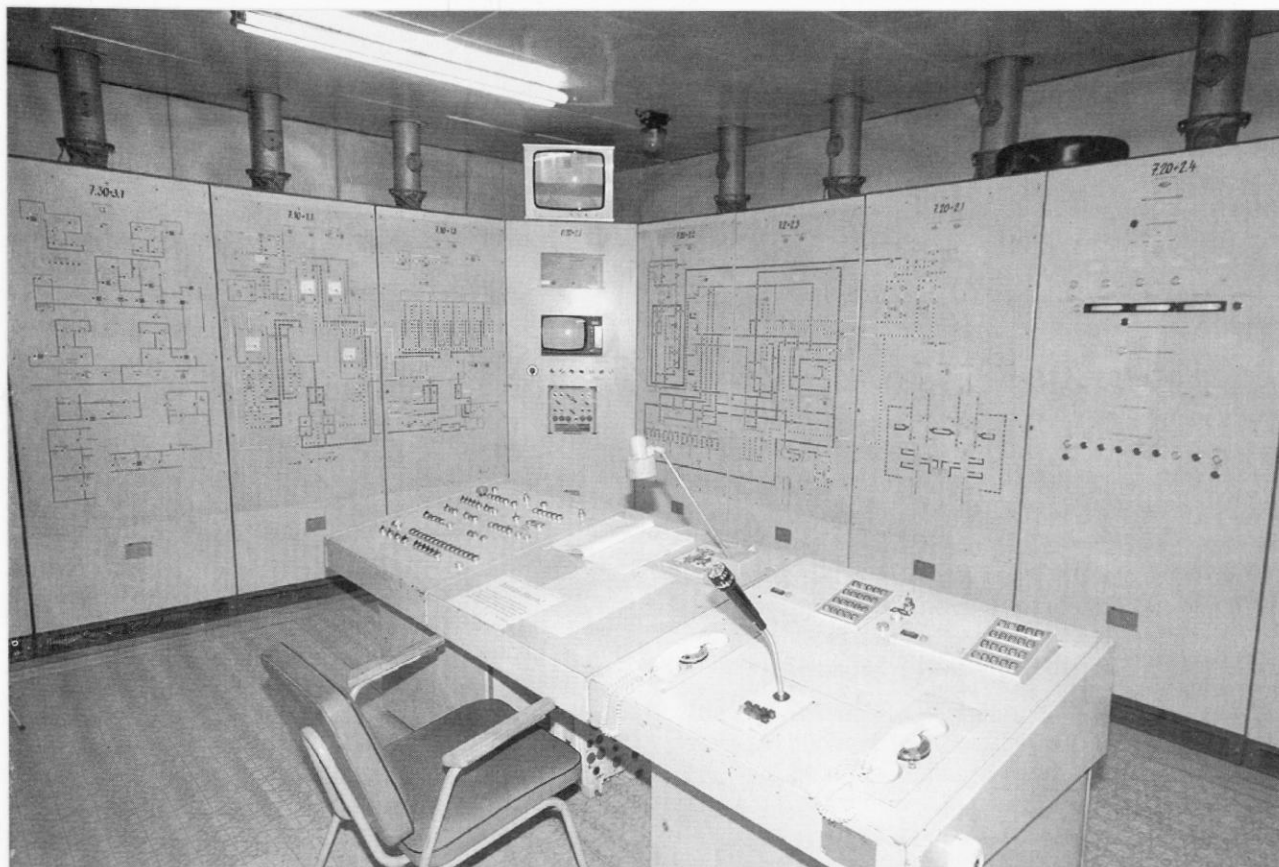
Facility 301 is located near the village of Wollenberg, 45km NE of Berlin and 7km SE of Bad Freienwalde, approximately halfway between Berlin and the Polish border in an area densely populated with former NVA, East German government and Soviet bunkers and protected sites.

Construction of Site 301 was started in the early 1980s (approximately 1982) as a direct result of a meeting in Moscow in September 1980 which concluded that, as there had been increasing tension between NATO and Warsaw Pact countries during the previous decades, the Soviet countries needed a resilient radio transmission and receiving network which would withstand a nuclear conflict more successfully than the current system in use. The entire system was organised into a grid to allow

for continuation of service should any sites in the network become unavailable, there was also a provision for the Western sites to be switched remotely from either Site 301 or the site in Legnica, Poland (Site 202). Remnants of the system are still in use today in Russia.

Site 301 was completed in 1985 and brought into use around 1987 – from planning to commissioning in around five or six years – this was considered a quick turnaround and was chiefly due to the high priority

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The Dispatcher or control room - Photo Dan McKenzie

allocated to the construction and implementation of the BARS system, the northern site (302) was the last one built in East Germany in 1988. The DDR (East German) section of the BARS network was handed over to the Bundeswehr (West German Army) and decommissioned in 1990/91 as the Cold War was all but over. Construction costs for each site were estimated to be approximately 50 million Marks (15-20 £million) with the communications equipment costing extra. Each bunker in the entire system was built to an almost identical plan with each site capable of transmitting to the other nearby sites in the system in up to four directions, although at Wollenberg only three of the R-417 BAGET transmitters and masts were installed and used, the fourth West facing transmitter would be commissioned in the event of the Soviet forces moving into West Germany and beyond where they would use mobile R-417M tropospheric transmitters to communicate back to the BARS fixed sites. The bunker at Harnekop (main command post for the former East German Defence Ministry) would have been the principal user of this facility at Wollenberg. In 1988 an exercise was held at Wollenberg where they relayed information from Magdeburg (over 180km away) out into the BARS network.

During planning, construction and use the BARS sites were only ever referred to as 'communications

centres', their functions as BARS facilities were never discussed in an attempt to conceal their strategic nature. The 'official' explanation for the facilities at Wollenberg was that it was for an Air Defence Relay site. Rumours spread amongst locals as to the "true" function of the bunkers: at 301 it was thought that SS-20 missiles were going to be brought in and installed, at the landlocked northern site (302) rumour had it that the bunker was going to be an underground harbour for the East German Navy as their HQ was located nearby.

Construction of the bunker was by an extreme version of 'cut and cover': the chosen site was a sandy hill so the hill was removed, the bunker built

Forward tropospheric scatter system:

Large transmission dishes sending a large signal to the lowest part of the ionosphere (approximate altitude 12-17km) where it is reflected back to the surface of the earth where a large receiving dish is trained to the foci of the signal in space, this will pick up sufficient of the signal to enable it to be decoded and used or retransmitted (i.e. relayed). A tropospheric scatter system allows for relay leaps of up to 200-300 miles. The NATO equivalent to the BARS system was called Ace High. http://www.subbrit.org.uk/rsg/features/ace_high/

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The "HSA" Electric Fence in the background, with a mounting for a nuclear blast detector in the foreground - Photo Dan McKenzie

and then the hill was reinstated over the two level concrete construction which measures 30 x 30 x 14m high. Walls and ceiling are 60cm thick and there is a 1.5M thick bed of gravel directly over the top of the bunker with a 40 x 40m blast cap 2.5m thick covering the whole of the top of the structure.

The bunker has two principal entrances: one for personnel and one for equipment and machinery. You enter the bunker from a long narrow rising corridor and once at the top you pass through a series of standard Soviet 1.8m high 1.5t blast doors through either the 'clean' or 'contaminated' routes. The 'contaminated' route takes you through a succession of airlocks where you would be monitored for NBC (Nuclear, Biological, Chemical) contamination with ageing but effective Russian manufactured monitoring equipment dating from the 1970s.

The top floor of the bunker was used primarily for the communications equipment whilst the lower floor hosted the engineering equipment and life-support systems. A staff of approximately 25 mainly NVA personnel would be on duty to run the bunker with only two Soviet officers on duty full time. The site was only used for routing communications and was not an

HQ and only two people were needed to run the 1000 - 2000watt 4.7Ghz short wave transmitters and control centre as most of the equipment was automated. In the event of a major system-wide communications failure, contact with other key sites could be maintained by using a very basic phone system consisting of a network of hard-wired phone lines called 'special cables'. These 'special cables' also terminated in secret key locations all over the country where mobile units could simply plug in to the system. Messages could be encoded in the bunker in the encryption room; this is a soundproofed room that contained the encryption equipment. Sadly, none of the original ZAS (Russian abbreviation: encryption equipment) and SND (NVA abbreviation: encryption and communications service) Russian encryption equipment survives – each piece of equipment was carefully and methodically removed from each and every site across the whole of the former DDR, the equipment being removed from Wollenberg in August 1990. The nearby telephone exchange or frame room is entirely encased in a 5mm thick steel shield to help reduce any effects of an EMP (Electro Magnetic Pulse).

The volunteers and owners of the Wollenberg site have restored most of the contents of the bunker,

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including the main communications control room and its Russian built equipment, to their former glory. The previous occupants left some of the equipment behind whilst other parts of the technical equipment were recovered from both the northern and southern sister sites of the DDR BARS network. In addition to all the equipment, the owners also have a full complement of installation and instruction manuals for the bunker.

The air handling plant was capable of constantly sampling the incoming air and would automatically shut off the current fresh air supply and divert onto recirculated or filtered air in 1/100th of a second. In addition to the standard large green barrel type Russian FP-300 air filters, catalytic purifiers could also clean the air. Unusually, the bunker did not possess its own borehole and instead relied on a stored water supply consisting of two tanks: one for drinking water and one for equipment cooling water, two large refrigerant compressors containing R22 gas cooled the water. Sadly, the air cooling and recirculation system for the bunker is no longer in use due to the cost of running the equipment: they use up to 1gW of power per year and it was known to cost 34000 Marks a year to run it. Air compressors were used to supply an overpressure in the bunker and also to pressurise the silver lined copper waveguides that took the radio signal from the transmitter room to the top of the mast. The radiation produced by the Klystrons in the transmitter room was so strong that the rooms had to be encased with metal plates.

Although the dispatcher's room had been fire damaged by vandals in the past it has now been restored to a semi functional state with either original refurbished equipment from the bunker or parts rescued from the flooded northern and southern bunkers. The dispatcher's room functioned as a remote plant room control suite where the main life support systems in the facility could be controlled centrally. The dispatcher could lock and unlock or open and close the heavy blast doors, switch and reroute the air circulation, remotely monitor the diesel generators and generally oversee the plant and machinery from this one location. At Wollenberg, the dispatcher was also capable of remotely monitoring the functionality of a handful of other nearby bunkers in the BARS network.

The three six cylinder 5000HP diesel generators at Wollenberg would auto-start in the event of a mains supply failure and had an output of 450kVA each. The bunker could function with only one generator running but ideally it needed two. Generators of this type are often referred to as marine diesels and, although they were used in marine craft, they were only used as diesel generators – an identical function to the one they fulfil now. Fuel for the generators was stored in two 14000 litre tanks and the exhaust fumes

from the generators were cooled before they were expelled in order to reduce any external thermal plume in an attempt to conceal the site from over flying NATO satellites or reconnaissance aircraft.

Three 21-metre high masts were constructed and each mast had a one transmitting and one receiving capability. Each transmitter had to have a dedicated air intake to aid cooling; the air intakes (and cooled exhaust outputs) were disguised as ordinary, though camouflaged, surface buildings. At the base of each mast there was a service entrance that allowed for easy connection to the mobile BARS units that could run the site in the event of part or all of it being rendered unserviceable.

Although the site never had an active guard unit continuously patrolling the perimeter of the 22.5-acre complex, they did have a 12000-volt electric fence that appears to have been very effective as no one was ever *reported* to have been caught or injured on it. Apparently the fence is still in working order and is the only one of its type still functioning.

The previously mentioned mobile forward communications BARS equipment was housed on-site in 4 purpose built hardened garages plus an extra garage for a mobile crane which would be used to repair the masts if they got damaged. Fortunately, the site owners managed to track down the mobile BARS kit and were able to recover a full complement of vehicles (i.e. five vehicles + associated equipment) from the Bundeswehr stores at Koblenz. These vehicles are virtually complete and are in pristine condition.

The bunker at Wollenberg only had a relatively short operating lifespan of three or four years as the end of the Cold War rendered this section of the BARS network surplus to requirements. The whole site has undergone a sympathetic restoration and is now open to visitors on most weekends and is a superb example of a preserved former Soviet Union/NVA communications bunker as opposed to a museum full of artefacts. In the past two years the museum has attracted approximately 2500 visitors.

From Robin Ware

Sources:

Mike Barton, Joachim Kampe & Paul Bergner

Further reading:

Operation Filigran by Paul Bergner (in German only), private publication, which can be ordered from Paul at wandlitz@gmx.de

Bunker Wollenberg's Website:

<http://www.bunker-wollenberg.de>

Edgware Junior School Air Raid Shelter Dig



In a cold and wet week in February a team of diggers including several HADAS members unearthed a large concrete air-raid shelter under the playing field of Edgware Junior School. The shelter had been sealed for almost sixty years and was excavated as part of a UCL project aimed at combining the archaeology, history and memory of the Second World War.

Records show that shortly after the start of the war the Hendon Education Committee contracted the construction of air-raid shelters in schools to Messrs Lavender McMillan Ltd, at a price of £259 10s each. A variety of different kinds of shelters were produced at this time by different companies. Some were built out of segments of panels, others were cast in situ with steel reinforcements.

At Edgware School classes were taught in children's homes until enough shelters, thirteen in all, were constructed for them to return to school. Air raid drill was practised regularly, with the children traipsing down to the shelters where lessons continued underground. The school was damaged by bombing in 1940, presumably because of its proximity to the railway sidings, and was nearly hit again by a V1 doodlebug in 1944. No children were injured in the bombings.

Although the archives record thirteen shelters at the school, only two are clearly visible on the surface. The archaeological work aimed to open up one of the shelters to get a good look at it inside and out, and also to establish the locations of at least some of the others. A resistivity survey was carried out in November 2005 by the UCL/HADAS team, revealing a number of rectangular shapes beneath the soil, some of them very clear. This appeared to show at the most eight shelters beneath what is now the school football pitch. The excavation began with the main trench, designed to clear the earth and rubble out of the entrance staircase, and gain access to one of the shelters. This began to produce artefacts of all ages, including a 20p coin and a variety of stoneware. A third trench was opened over the roof of the shelters, to examine the roof and to locate the

shelter in relation to the resistivity readout. As the main dig progressed it became clear that the staircase down to the shelter was a single piece of cast concrete, while the shelter was constructed from prefabricated panels of reinforced concrete, and at least partly from bricks and mortar. The staircase had shifted slightly, possibly due to root disturbance, and was no longer precisely aligned with the shelter.

The pinnacle of the dig was the 'Howard Carter' moment: stepping into the newly opened dark doorway with a torch and announcing that we could see "Things! Wonderful things!". In truth, the interior of the shelter 2 was quite sparse, as fittings were stripped before they were sealed, and in the case of the two chemical toilets we were rather grateful for this! However, significant portions of the electrical fittings remained, as did a scattering of artefacts including a hurricane lamp, an inkwell, a fire bucket, a gas heater and a mysterious pair of shoes. As we had hoped, some of the graffiti left on the walls by the kids had survived – a chalk drawing of a sailing ship with a cross on the sail. There was also, remarkably, an entire wall of maths problems chalked onto the brick, as fresh as when it was first put up!

On the second day of the dig we were lucky enough to be visited by Tessa Smith, HADAS member and former pupil at the school during the war. Tessa told us about the shelters she remembered, which interestingly were not under the present playing field, but elsewhere in the school grounds. This made the total of thirteen seem much more feasible. She described sitting in the shelter on benches, closely packed together in rows, singing patriotic songs to pass the time. Tessa also spoke to Year 6 children at the school, telling them about her recollections of school in wartime, and answering their questions. Her visit to the site provided valuable information for the archaeologists, and a wonderful experience for the children whose enthusiasm for the project as a whole was remarkable.

The dig was a resounding success both from an archaeological perspective, recording and studying the buried structure; and from an educational point of view by giving the experience of the Second World War a human voice and a physical presence in the school. The shelter will remain open, and the school hopes to use it in teaching the War both for themselves and for other schools in the area. We are continuing to work with the school, getting the children involved in other archaeological activities including finds cleaning and sorting. This dig was made possible by the participation of hardy and hard-working HADAS volunteers, and by the kind loan of HADAS equipment. My thanks to all involved.

From Gabe Moshenska

Hendon and District Archaeological Society

German Fortifications on the Cherbourg Peninsula

With the Pas-de-Calais within easy reach of England through the Channel Tunnel, that section of Hitler's Atlantic Wall has been a regular destination for day trippers from the UK for many years. The Cherbourg Peninsula however, although bristling with fortifications, is less often visited as it involves a long drive down from Calais or a long and expensive ferry crossing.

Sub Brit member Bob Clary arranged a day trip to Cherbourg on 26th March 2006 but in order to have a full day in the area we booked onto the overnight ferry from Portsmouth on the 25th, returning overnight the following day, it was destined to be a long but potentially very rewarding day. Those taking part were Bob Clary, Nick Catford, Robin Ware, Richard Savage and Dom Jackson. The overnight ferry only operates in the winter and this was the last weekend. With only 15 cars and a couple of lorries on the outward journey it is surprising the service is financially viable.

Bob prepared a varied list of sites which included gun batteries and radar installations with a particular emphasis on sites with tunnels; so armed with that, a collection of large scale local maps and a satellite navigation system we assembled at Portsmouth harbour mid evening for the overnight crossing. The forecast for the following day was poor with rain expected and for once the forecasters didn't let us down, it did indeed rain for much of the day but we didn't let it dampen our spirits.

We arrived in Cherbourg ahead of schedule and 6 am in pitch darkness, the clocks had moved forward overnight and we had gained a second hour by crossing the channel so we knew it wasn't going to start getting light until at least 7.30. We made our way to the first site which was the Petit Thot coastal battery near Biville. Four casemates remain in good condition although two of them have been partially filled with concrete rubble to prevent cattle falling into the sunken gun pits; they were originally armed with 10.5cm Schnieder guns dating from 1917. A small two storey fire control post stands close to the southern casemate. Two long barrack blocks standing at right angles to each other can be seen to the rear of the casemates. Each room has its own entrance and a central chimney with some original wall decorations still in place in some of the rooms. The buildings have been put to agricultural use with some of the rooms being used as a wood store by the local farmer. A number of other buildings remain



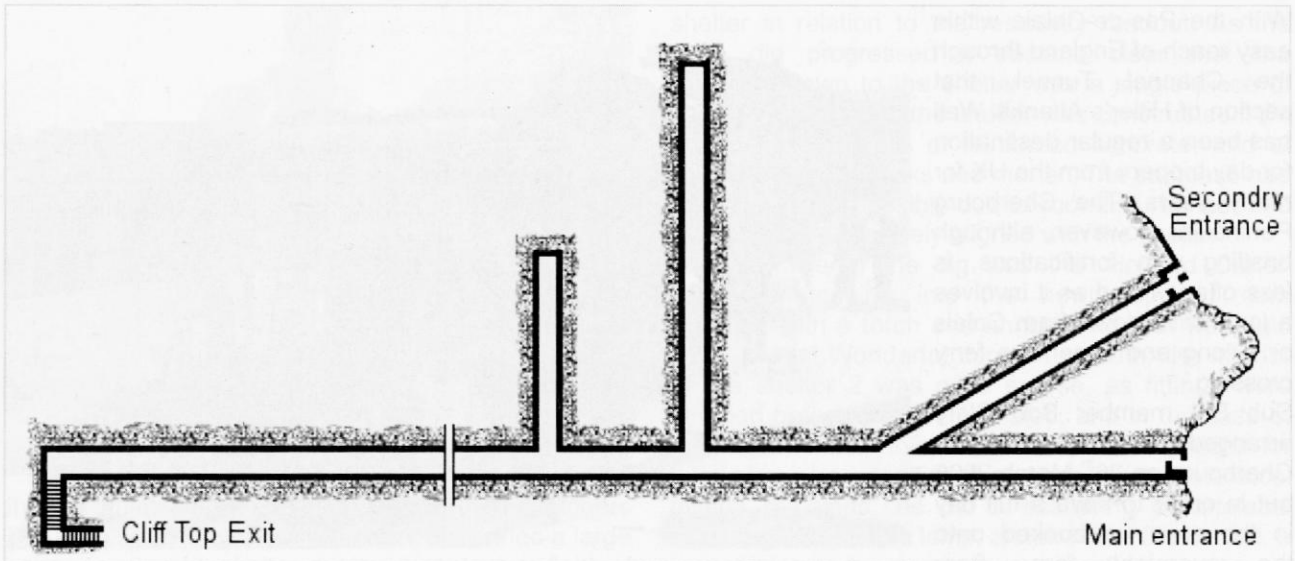
Batterie Alvf - Installation of the 20.3 Cm Kanone E Railway gun at Batterie Alvf

on the site including a guardhouse and ammunition stores.

Our second destination was Batterie Alvf near Auderville. This battery had two 20.3 cm Kanone E railway guns mounted on railway wagons anchored on 35 metre diameter turntables in large open emplacements. Unusually these railway guns were nowhere near a railway line; in fact the nearest rail connection was 25km away. Most of the remaining buildings are to be found in a line running south west from the D901 road. The first bunker, closest to the road was a munitions store and alongside it a medical bunker which is completely flooded. Beyond this are the two emplacements surrounded by ready ammunition lockers and small personnel shelters. Between the two emplacements there are three larger personnel bunkers; these are in good dry condition retaining some of their original internal steel doors and some ventilation trunking. Beyond the emplacements there is a further munitions bunker.

A short distance away is the Laye Tunnel, 185 metres in length and running from the road to the cliff top overlooking the Baie D'Eclagrain between Auderville and Laye. The purpose of the tunnel is unknown and there is little evidence of any fortifications on the cliff top other than a partly buried concrete plinth that could have been the mounting for a gun. 25 metres in from the blast protected single entrance there is a junction with a secondary entrance tunnel which runs back at an acute angle for 45 metres emerging at the base of a low bank in a field behind houses. Here there is a small chamber with two adjacent doorways; the entrance to the tunnel is offset from the two doorways for blast protection. In the centre of the concrete lined tunnel there are two bays, one 20m and the other 40m in length, these could have been used for munitions storage for one of the coastal batteries or as a

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Laye Tunnel



Laye Tunnel - Intersection of the two entrance tunnels



Laye Tunnel - Roadside entrance to Laye Tunnel

personnel shelter. At the far end of the tunnel two flights of steps lead up to a small quarry on the cliff top.

Although the original purpose of the tunnel is unknown it was certainly used as a shelter for both Germans and French villagers for over a month during the battle for the area and it still provides a useful unofficial access to the cliff path and in fact during our visit three cyclists equipped with head torches rode by.

The second coastal battery at Auderville is called La Roche; it's sited close to the cliff top above Goury. The battery was armed with six French WW1 guns, three in casemates and three in open emplacements. The three casemates are still in excellent condition and have all been converted into cattle pens with the gun pits infilled in two of them. We only found one of the open emplacements surrounded by flooded ready ammunition lockers, one of the others was badly damaged during an attack by the RAF. Other surviving buildings include anti-aircraft (Flak) emplacements, personnel shelters and Tobruk machine gun emplacements. Many of the surviving bunkers have been put to agricultural use and are kept locked.

Cap de La Hague forms the north west tip of the Cherbourg peninsular and the only surviving feature here is a massive searchlight bunker built on the sea front. The 60cm searchlight was stored inside the bunker which acted as a 'garage'; when required it could be winched up a steep ramp at the rear of the bunker to its operational position on the roof. From this raised position it could illuminate both incoming allied aircraft and ships and was used in conjunction with the two coastal batteries at Auderville to light up attacking aircraft.

The bunker is located on the coast path with free

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public access, it is open but a little wet underfoot. On one side of the bunker is a large open doorway into the room where the searchlight was stored. From here metal doors lead into the generator room and the personnel room. There is also a separate access into the personnel room from outside the bunker but the door is rusted shut.

A short distance along the coast path is the mangled remains of German radio mast that was used for communications with the Channel Islands.

The Gouesneraie radar bunker at Digulleville housed a Mammut Radar system.

The radar antenna was mounted on top of three huge concrete pedestals that can still clearly be seen on top of this large bunker of which only four are known to have been built. The Mammut Radar had a range of 300 km and was used as a rangefinder for the adjacent gun batteries and for locating shipping.

Internally the bunker is in excellent condition retaining all of its original steel doors and some of the ventilation trunking. Recessed cableways can be seen in the floor and the truncated cables can still be seen coming through the wall of the bunker. The concrete mounting for the radar apparatus can also be seen in several of the rooms.

Externally there is a ladder giving access to the top of one of the concrete pillars where a number of metal tubes that brought the cables out of the building to the antenna can still be seen. A number of smaller buildings and aerial mast bases can be found in the adjoining fields.

Castel Vendon has been visited by Sub Brit members before and for those that hadn't seen it before it was the highlight of the day

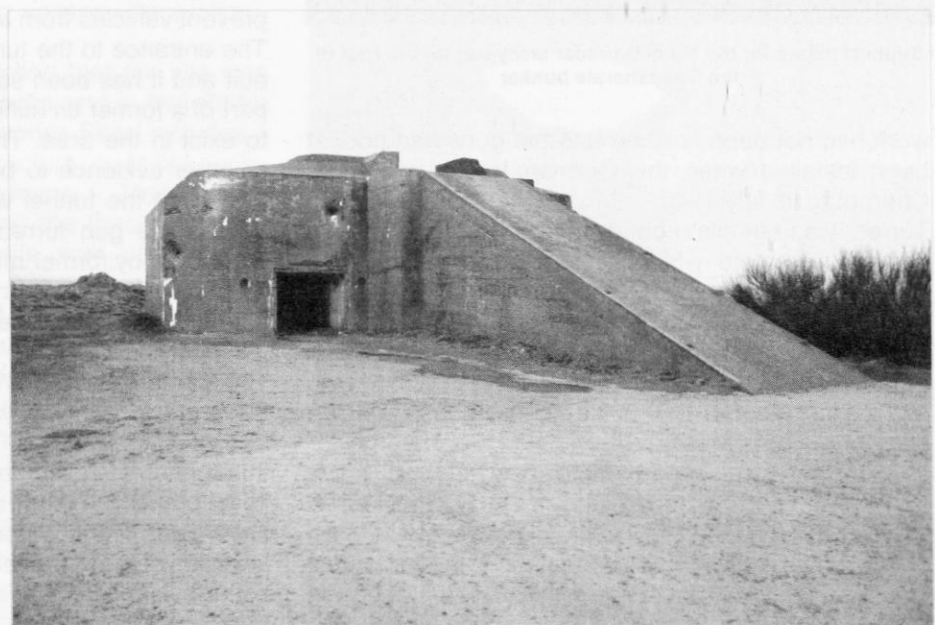
In 1924 the French Navy ordered two 34cm turret-mounted Schneider guns for coastal defences of Cherbourg and the site



One of the casemates at La Roche Battery

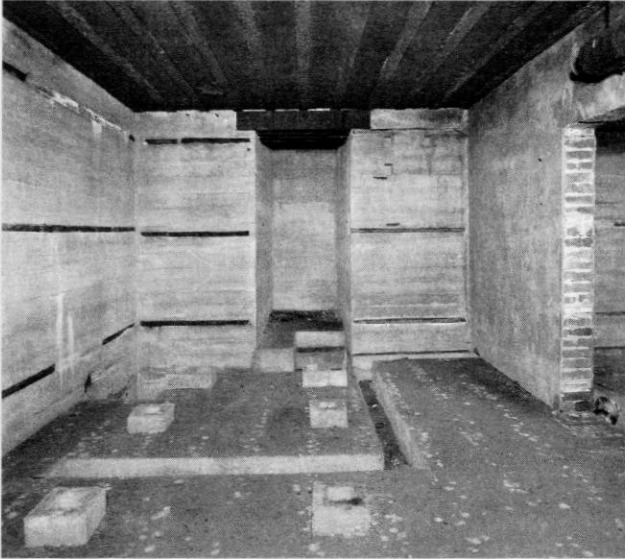
chosen was Castel-Vendon, 5 miles west of the town. The guns which would have had a range on nearly thirty kilometres were delivered in 1928 but because defence cuts they were put into storage at the naval base.

In 1935, with the approach of war in Europe, France rapidly began to strengthen its defences and work started at Castel-Vendon. Two deeply recessed concrete gun pits were built to mount the guns a short distance back from the cliffs; these were connected by tunnels and had underground accommodation for personnel and munitions. The



The searchlight bunker at Cap de La Hague

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Inside the Gouesneraie radar bunker at Digulleville - one of the equipment rooms showing radar mountings and recessed cableways.



Support pillars for the Mammut radar array can on the roof of the Gouesneraie bunker

work had not been finished and the guns had not yet been installed when the German forces arrived at Cherbourg in July 1940.

Turret 1 was complete but not fitted out, Turret 2 was partially complete while the underground workings were about 75 per cent finished. In 1942 the Germans started work at the site, initially as part of the West Wall, adding a battery of four Skoda 6 inch SKC/28 guns in concrete casemates, together with two 2 inch guns and a range-finding bunker on the edge of the cliffs.

It is unclear what happened to the two guns. They may have been scrapped and melted down before the war but this seems unlikely. Had they fallen into German hands they would certainly have been used. The area is still designated as military land although there is no evidence of recent use by the military. The gun pits are contained within two separate barbed

wire fenced areas which is now heavily overgrown making access difficult. The remainder of the land, including the remaining casemates is used for grazing horses.

Three of the four concrete casemates are still standing and are in good condition. Casemate No 1 has been completely destroyed. The Battery was fired on by a British and American Task Force just before its capture.

Turret No. 1 is set at the bottom of a 15 foot depression; because of the dense undergrowth it is not possible to see it from any of the paths round the site. It consists of a wide gently sloping concrete rim flush with the ground and about 50 feet in diameter. The pit itself is about 25 feet deep with vertical sides. In the centre there is a hole, 6 feet in diameter, down to an arched chamber below. Turret No. 2 is of similar diameter and also set in a 15 foot deep depression. This structure is not flush with the ground standing some 8 feet high with vertical sides. A ring of exposed reinforcing bars indicates that it was never finished.

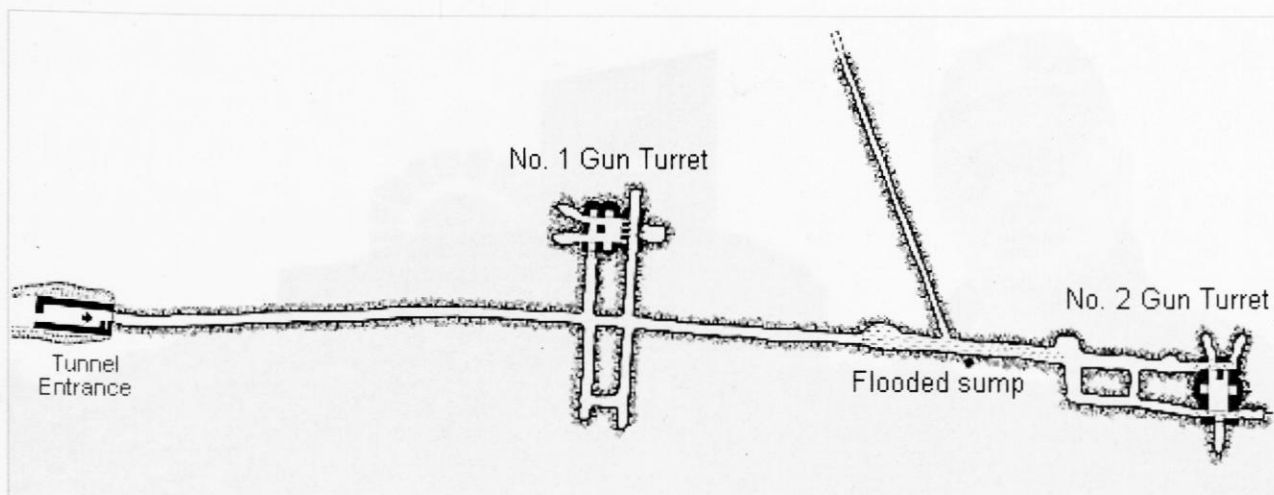
The entrance into the tunnel network is on the east side of a minor road running north from the D45 towards Gruchy. Turning north off the D45, the road crosses a small wooded valley after about 200 yards. The entrance to the tunnels is on the east side of the road where there is a barely readable sign indicating 'Terrain Militaire'. A number of concrete structures can be seen close to the road, one of these is a ventilation tower up from a network of buried culverts that presumably drain the tunnel network. Water can clearly be heard flowing some 20 feet below.

A wooded cutting leads towards the tunnel adit at the base of a low cliff. Close to the adit there is a large concrete block. Its purpose is unknown but it would prevent vehicles from approaching the adit.

The entrance to the tunnel system resembles a mine adit and it has been suggested that the tunnels were part of a former tin mine of which several were known to exist in the area. There is no visible mineralisation or other evidence to back this theory and it is more likely that the tunnel was constructed specifically to access the gun turrets. Military tunnels were often excavated by former miners.

The main access tunnel is unlined throughout and although there is a little water at the entrance it is dry for most of its length. The tunnel runs eastwards for 100 yards to a crossroads. To the right there is a blind end after forty yards. Straight ahead there is deep water. In Alain Chazette's book 'Atlantikwall' this tunnel is shown heading towards Turret 2 with a long branch ending close to the rear of No. 2 casemate. If this is correct this tunnel must be at a lower level and is presumably now flooded. There is some evidence at the rear of No. 2 casemate where overgrown steps can be seen lead down to a sunken track.

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Plan of the Tunnel network at Castle Vendon

To the left of the crossroads there is a section of concrete lined tunnel after twenty yards with several arches on the right hand side into the chamber at the base of the turret with the 6 inch diameter hole out to daylight in the vaulted roof. A second concrete lined tunnel leads from the far side of the chamber back towards the main entrance tunnel.

There is little metal to be seen, a few pipes, probably part of the ventilation system and some of the wooden shuttering is still in place embedded in the concrete indicating that the structure was never completed. Some ventilation trunking can also be seen high in the wall. There are also a number of side chambers some concrete lined and others unlined.

The site is a bat hibernaculum and a large number of bats of various species were noted in the entrance passage so access to the tunnel network is not advised during the hibernating season, December - March.

There has been some speculation that the site was considered or used for V-weapons and in fact Phillip Henshall's book 'Hitler's V Weapons Sites' includes a plan of the site with a third structure, possibly a silo, presumably built by the Germans. There is no evidence on the site to support the theory that this was ever built or that the site was used for V-weapons.

The Kriegsmarine Battery at Amrefville is also still in military hands although once again there appears to be no recent use and the hilltop site is now used for animal grazing. The site is best approached from the west side where there is easy access to the four casemates that housed 10.7 Cm. German guns defending the western approach to Cherbourg. The casemates are all in good condition with an internal ladder down to a lower plant level.

Unusually the alignment of the casemates is slightly different. To the rear of the site there is a large two storey fire control post with another small building on



No 1 turret at Castel-Vendon Castel-Vendon



The underground chamber beneath No. 1 turret

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Amfreville - The fire control post at Kriegsmarine Battery at Amfreville

the roof. A number of other buildings survive to the rear of the fire control post, these include workshops and stores and a couple of earlier brick buildings indicating that the site was an earlier 19th century French Fort.

During the liberation of Cherbourg the battery came under fire from the British cruisers Glasgow and Enterprise and HMS Glasgow was damaged during the melee. Later the USS Texas entered the affray until the battery was captured by land forces.

Our final site of the day was Fort Roule, an old 19th century French hilltop fort on the south side of Cherbourg. The fort itself is still an active military base although a small part of the grounds housing a museum and including the entrance drawbridge is open to the public.

Below the fort there are four casemates precariously sited high on the cliff face in 1944 to defend the harbour. Because of their position access to the casemates was through a network of tunnels running through the hill. The casemates were armed with 10.5 Cm. U-Boat guns taken from the base at Cherbourg.

The tunnels are unlined throughout entering the four casemates and the fire control post from the rear. A number of short side galleries near the casemates were for munitions storage. Close to the entrance there are two concrete plinths, this is where the standby generators would have been mounted. The fronts of the casemates have all been bricked up because of their dangerous open position on the cliff face and to prevent access to the fort above. Unusually for German fortifications, some of the

ventilation plant survives including enclosed fans in two of the casemates.

At the base of the hill we noticed a large lined tunnel portal in the rear garden of one of the houses at the bottom of the hairpin road up to the fort. This is of French origin and is part of a network of tunnels on three levels below the fort. The tunnels were originally built by the French Navy and used for ammunition storage by the French and later the Germans until after the war. The tunnels are now in private use housing some kind of industrial plant. The entrance we saw is now blocked after a short distance with the main entrance further along the N13 road.

By Nick Catford

Sources:

'Hitler's V Weapons Sites' by Phillip Henshall ISBN0-7509 2607-4 - Sutton Publishing 2002

'Atlantikwall' by Alain Chazette, Alain Destouches & Bernard Paich ISBN 2 84048 088 3

The Atlantik Wall in Normandy <http://www.atlantikwall.org.uk/> Excellent web site by John Flaherty listing all the surviving German sites with photographs and directions

'Atlantik Wall' <http://www.atlantikwall.co.uk> Another good web site by Richard Drew

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